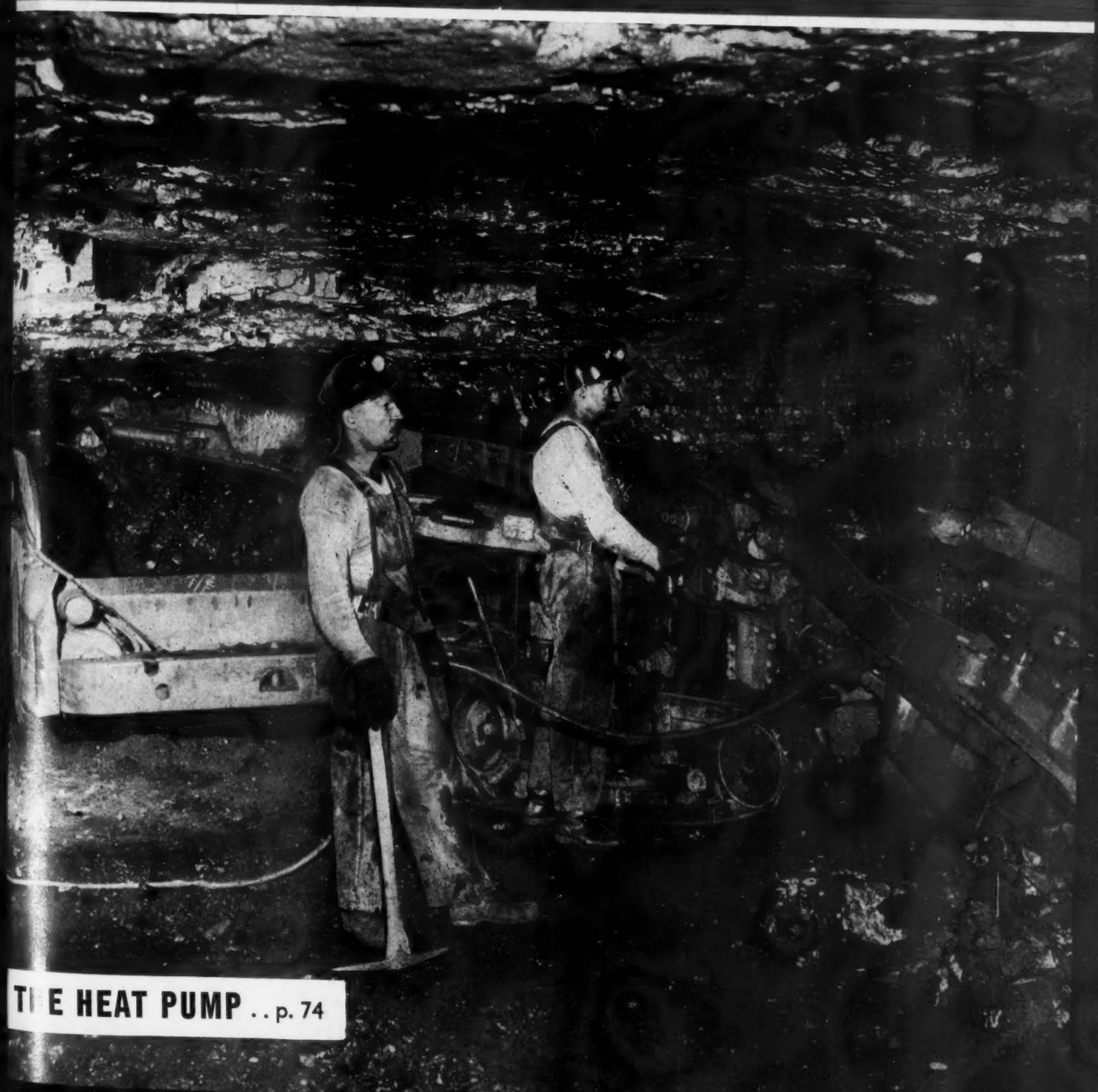
Coal Age

A McGRAW-HILL PUBLICATION

SEPTEMBER, 1947



THE HEAT PUMP . . p. 74

Increases Production . . . Saves $1664 a Year

SUN MINE LUBRICANT . . .

Eliminates Shutdowns Every Other Day for Cleaning and Lubricating Loading Machine

A big Pennsylvania mine was shutting down a loading machine every two or three days because grease was separating and forming gummy deposits in the transmission case and heads.

A Sun Engineer recommended they switch to a "Job-Proved" Sun grease that is used in many coal mines under similar operating conditions.

This grease maintains its consistency despite bad water conditions. Since they began using it in this mine, they have had to grease the loader only once every two or three weeks.

Estimated saving is $1664 a year on labor required for greasing. In addition, about one-sixth as much grease is now used, and more continuous production of coal has resulted.

From mine face to tipple, Sun "Job-Proved" lubricants mean maximum protection for mine machinery, maximum time on the job, and minimum maintenance costs. Call your nearest Sun office today.

SUN OIL COMPANY · *Philadelphia 3, Pa.*

In Canada: Sun Oil Company, Ltd.—Toronto and Montreal

SUN

SUNOCO

INDUSTRIAL PRODUCTS

Photo courtesy of Granite Rock Co., Watsonville, Calif.

Rubber elevator 14 stories high

A typical example of B.F.Goodrich development in rubber.

UP THAT "rubber elevator," to a height of 14 stories, go 1000 *tons* of rock *every hour*—rock that could never have been sold, would never have been available for construction jobs except for a B.F.Goodrich development.

The rock was there, but it was 130 feet below the crusher plant, and conveyor belts weren't strong enough to absorb the shock of 3-foot hunks of granite and carry the tremendous load up that long steep lift. It looked as though the rock couldn't be quarried, crushed and sold.

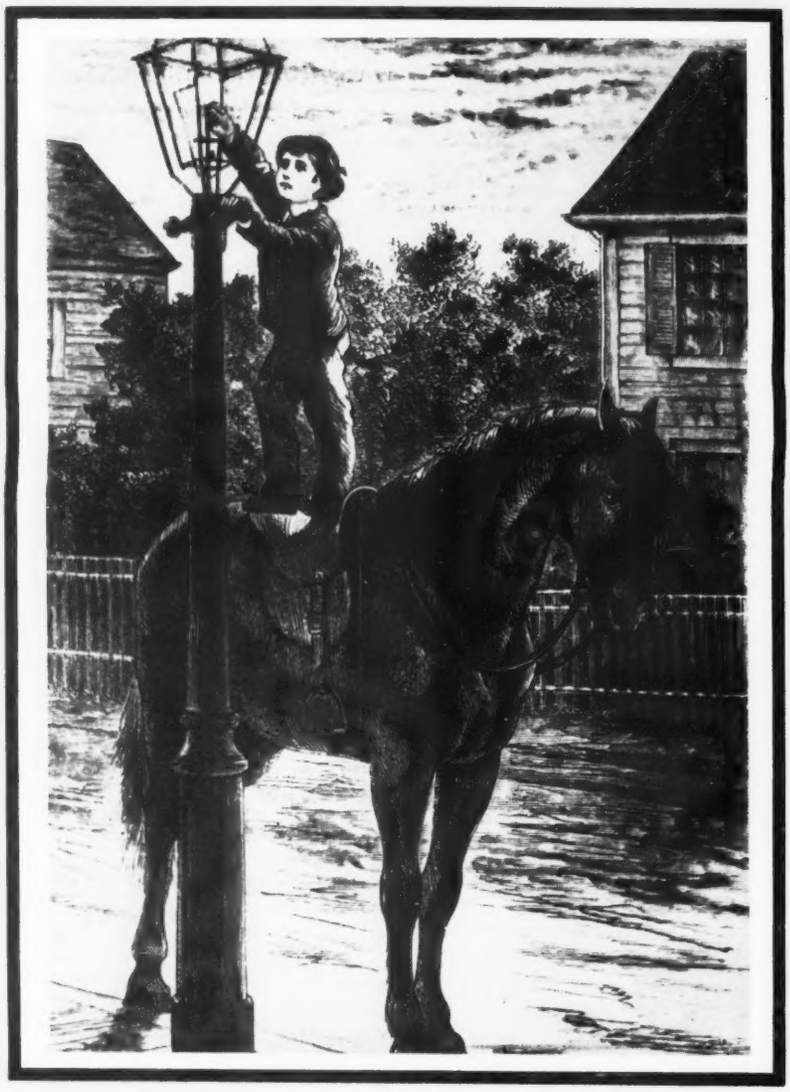
A B.F.Goodrich engineer told the owners about B.F.Goodrich Cord Belt. Unlike conventional conveyor belts of rubber and stiff woven fabric, B.F.Goodrich Cord Belting is made like a tire, of individual cords each imbedded in rubber—it has all the flexibility of rubber yet has hundreds of cords to give strength and load-carrying power. Where a shock might tear stiff woven belts, the B.F.Goodrich cords-in-rubber can "give," and so take up the shock and spring back to position.

A B.F.Goodrich Cord Belt was installed on this "impossible" operation. It has been carrying 1000 tons an hour without a moment's trouble or delay, without a cent of maintenance expense.

Here is one more of hundreds of examples of B.F.Goodrich research, which is constantly developing new and improved products to meet new problems and serve American industry better, at lower cost. Before you decide that anything "can't be done" by rubber, or that present methods or products are as far as you can go in cost-cutting, better find out what improvements B.F.Goodrich research has been making. *The B.F.Goodrich Company, Industrial Products Division, Akron, Ohio.*

B.F.Goodrich
FIRST IN RUBBER

First in its Field....



When "THE OLD LAMPLIGHTER" was young

Gloomy Dock Square, Boston, sprang into a "blaze of glory" on the night of January 1st, 1829. That was the lighting of the first regularly installed public street gas lamps in any city in the United States. As late as 1875 the gas lamps were lighted as shown above — later in less picturesque but safer fashion.

When you "see the light" and use HULBURT QUALITY GREASE for lubricating your coal mining machinery — you'll be following the example of experienced coal operators all through the industry. Yes, gloomy machine operators, repair and maintenance men cheer up when they see how much better machines run when HULBURT QUALITY GREASE makes light of lubrication troubles.

HULBURT OIL & GREASE COMPANY — PHILADELPHIA, PENNA.

Specialists in Coal Mine Lubrication

. . . a record of

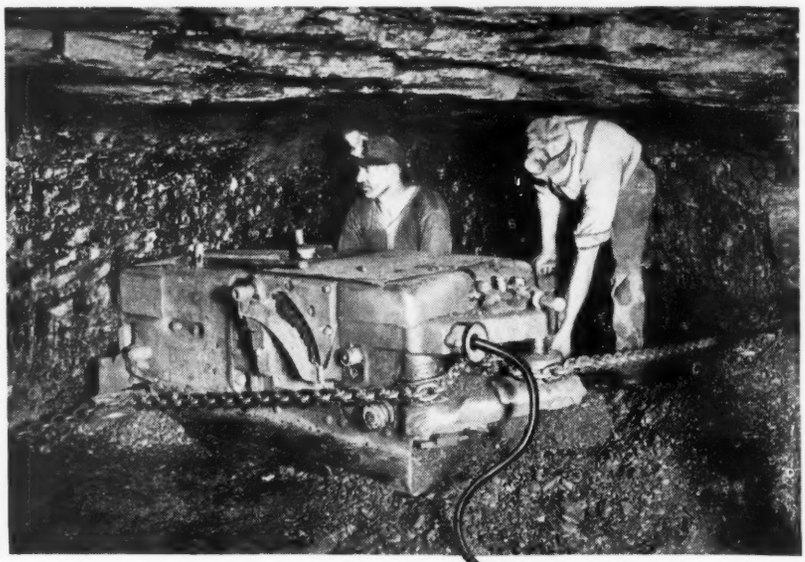
American Leadership

HULBURT

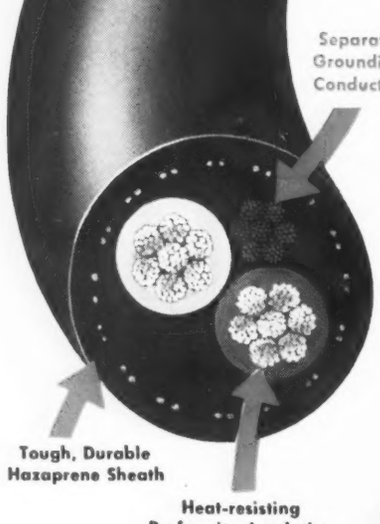
THE "FIRST NAME" IN

Quality GREASE

DOWN to EARTH SAFETY...



Hazacord Type G Mining Machine Cable with Separate Grounding Conductors



YOU can't buy a safer mining machine cable than Hazard Type G with its separate grounding conductors that assure a safe, down to earth connection at all times. In Hazard twin parallel cable construction, the grounding conductor is placed between the two power conductors; two conductor round cable has the ground wire laid in one of the interstices; in three conductor cable construction, the grounding conductor is usually split, one part in each of the three interstices.

And with Hazacord Mining Machine Cable, you get the extra safety, protection and long life provided by the well known Hazaprene jacket. Flame-resistant (Penna. Bureau of Mines Approval—104), abrasion, oil, water, and acid resistant, the Hazaprene jacket has proved itself again and again in the toughest kinds of service. What's more, Hazacord, always made with Performite heat-resisting insulation, safely carries approximately 25% more current than cable made with ordinary Performance grade insulation. Hazaprene fillers safeguard against moisture being drawn into the cable.

Have your Hazard representative show you point by point why Hazacords are your best buy from every angle. Hazard Insulated Wire Works, Division of The Okonite Company, Wilkes-Barre, Pa.

HAZARD

6032

insulated wires and cables for every mining use

Coal Age

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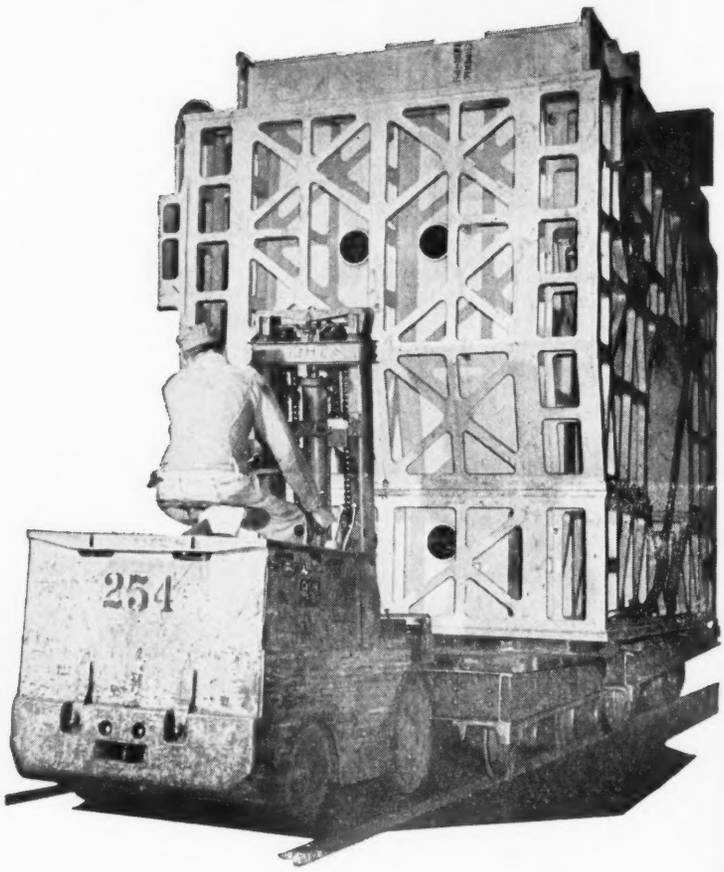
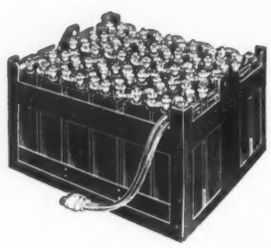
THEY GO ALMOST ANYWHERE

One of the unconventional but useful handling jobs often performed by battery industrial trucks is to push or pull heavy loads between craneways. Articles describing modern methods of material handling appear regularly in our STORAGE BATTERY POWER. Send for sample copy if you do not already receive it.



BECAUSE they are quiet and free from fumes, battery industrial trucks can be used without restriction in virtually any department of the plant. They can even be provided with spark-enclosed construction for operation in locations where fire and explosion hazards may exist.



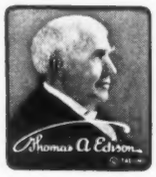
***In Industrial Trucks*, EDISON**
Nickel-Iron-Alkaline Batteries Give You These Important Advantages

- ★ They are **durable mechanically;** grids, containers and other structural parts of the cells are of steel; the alkaline electrolyte is a preservative of steel.
- ★ They can be **charged rapidly;** gassing cannot dislodge the active materials.
- ★ They **withstand temperature extremes;** are free from freezing hazard; are easily ventilated for rapid cooling.
- ★ They are **foolproof electrically;** are not injured by short-circuiting, reverse charging or similar accidents.
- ★ They can **stand idle indefinitely** without injury. Merely discharge, short circuit, and store in a clean, dry place.
- ★ They are **simple and easy to maintain.**

They use low-cost electric power and they use it with maximum economy, because they start instantly, yet consume no power during stops. With electric-motor drive for both traction and lifting, they have a minimum of wearing parts; are easy to maintain; are rarely out of service for repairs.

Thus, they are inherently dependable and economical, and this is especially important where they are working twenty-four hours a day. Here they have the additional advantage of operating from one battery while another is on charge; except for the few minutes needed to exchange batteries, they need not stop for servicing of the power unit.

They are extra dependable and extra economical when EDISON Nickel-Iron-Alkaline Batteries are used. With steel cell construction, a solution which is a natural preservative of steel, and a fool-proof principle of operation, they are the longest-lived and most durable of all storage batteries. *Edison Storage Battery Division of Thomas A. Edison, Incorporated, West Orange, New Jersey. In Canada: International Equipment Company, Limited, Montreal and Toronto.*

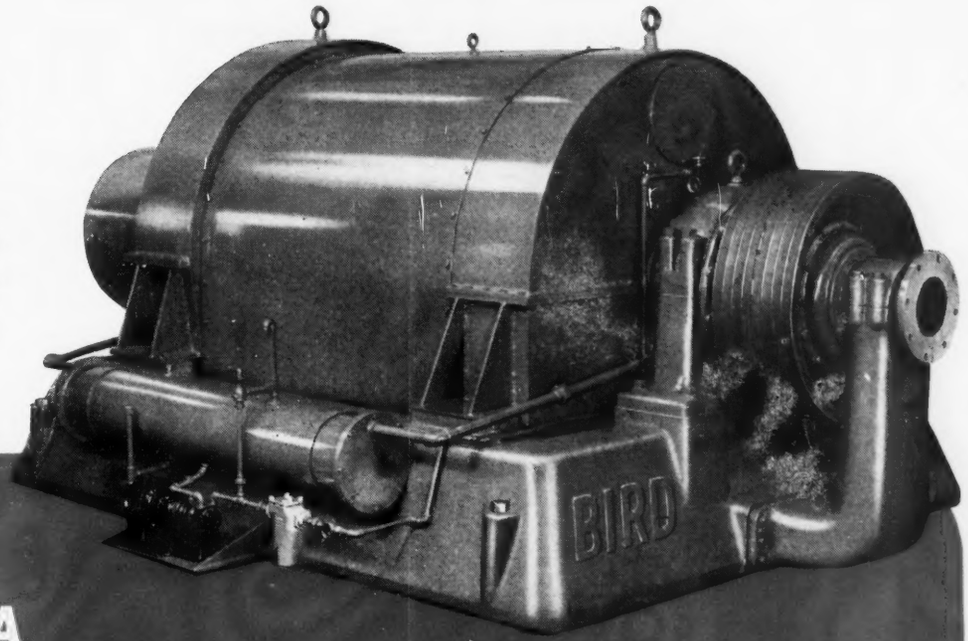


EDISON

Nickel • Iron • Alkaline
STORAGE BATTERIES

The BIRD is the accepted standard for efficient, continuous dewatering operations in many industries.

Hundreds of installations, many running steadily for five to ten years or more, testify to the performance and stamina of the Bird Filter.



IT'S A

BIRD!

WHEN IT COMES TO TAKING THE WATER OUT OF WASHED FINE COAL

The BIRD Continuous Centrifugal Filter takes the fine coal as it comes from your washing system, dries it just right for blending, and gets the water so clean it can be used over and over.

The BIRD handles forty tons of fines or more per hour—runs continuously with minimum attention and without parts replacements.

For performance and cost information, write *Bird Machine Company, South Walpole, Massachusetts.*

The BIRD *Centrifugal* FILTER

"THIS PUMP SET 11-YEAR Dewatering

In operation almost continuously since 1936, this A-C mine pump has required no major repairs

THINK WHAT THAT MEANS in savings of downtime and maintenance! Not only that — for these 11 years this all-bronze 9,000 gpm, 360 ft head single-stage pump has maintained its high efficiency . . . has effectively kept water from workings in a large coal mine.

Such a record can only be the result of sound equipment design, based on years of experience in building not only pumps, but coal processing, power and electrical equipment as well. Yes, you'll get top performance and year-after-year dependability of equipment when you buy from Allis-Chalmers.

You'll get real help, too, in getting lower operating costs and better tonnages. For Allis-Chalmers offers you sound, *unbiased* equipment recommendations . . . based on the requirements of *your* specific job.

Skilled engineers — coal industry specialists — are available now to help you plan tomorrow's equipment needs. Call your nearby A-C office. ALLIS-CHALMERS, MILWAUKEE 1, WIS.

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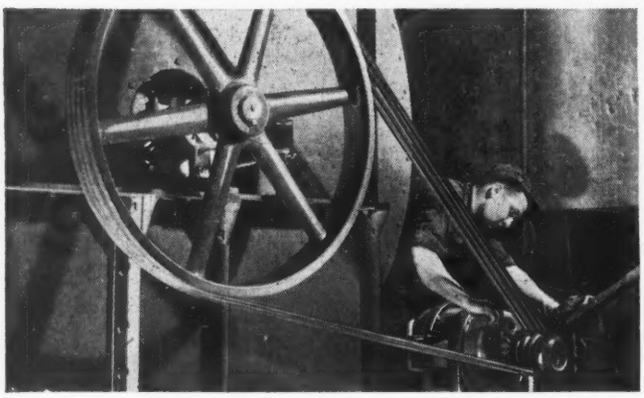
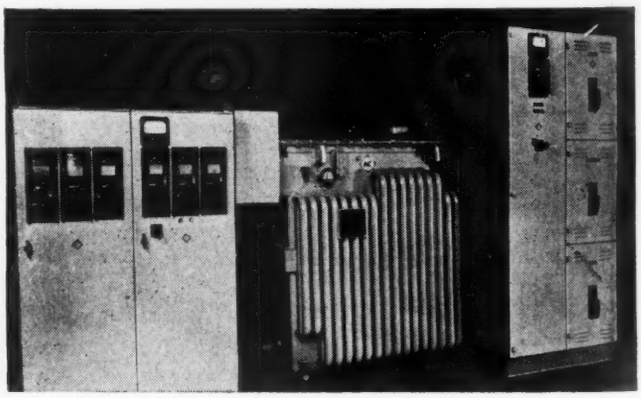


POWER TRANSMISSION

SUBSTANTIAL SAVINGS IN VENTILATION COSTS are possible with ample airways and modern fans, Allis-Chalmers motors and Texrope V-belt drives. Efficient Texrope drives provide speed ratios of 7:1 . . . permit use of lower cost higher speed motors. Exclusive duplex-sealed belt cover offers maximum V-belt durability in dusty, gritty locations. Texrope drives are shock-absorbing . . . protect bearings of both motor and fan. Belts available in Static-Resisting, Oil-Resisting, Oil-Proof types. **Send for Bulletin B6051G.**



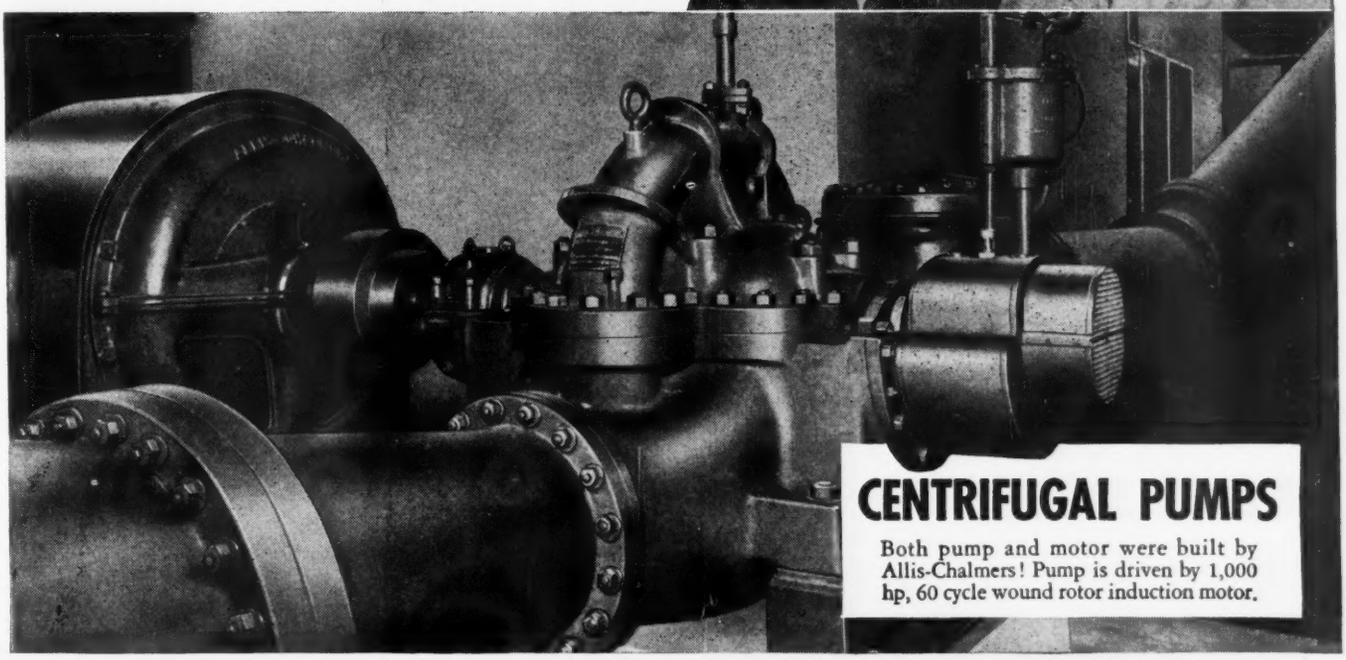
POWER DISTRIBUTION

BETTER VOLTAGE REGULATION and reduction of line loss and cable costs may be obtained with modern Allis-Chalmers metal-enclosed Unit Substations. Built for maximum safety . . . with no live parts exposed . . . these versatile units are available in combinations of switchgear and transformer elements to suit *any* installation requirement. Unit substations save power costs and increase efficiencies by bringing high voltages closer to load centers. Sizes 100 to 2,000 kva. **Send for Bulletin B6325.**

ALLIS-CHALMERS

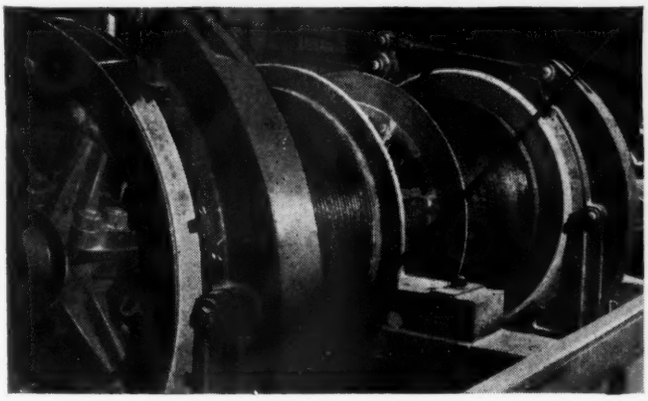
One of the Big 3 in Electric Power Equipment — Biggest of All in Range of Industrial Products

Record!"



CENTRIFUGAL PUMPS

Both pump and motor were built by Allis-Chalmers! Pump is driven by 1,000 hp, 60 cycle wound rotor induction motor.



MINE HOISTS

MORE ECONOMICAL HOISTING can be obtained with Allis-Chalmers all-electric mine hoists for shaft, skip or slope installations. Allis-Chalmers has built hundreds of hoists, including many of the world's largest . . . has engineered installations that have helped operators greatly reduce hoisting costs. Sure, smooth operation under all load conditions is provided by automatic "Regulex" control. Allis-Chalmers builds *all* auxiliary equipment . . . furnishes *complete* hoist installations for *any* requirement.

BASIC PROCESSING

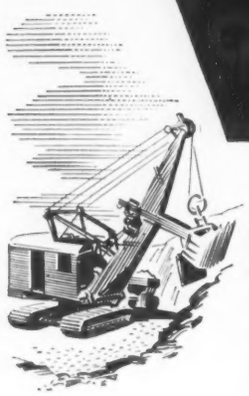
ESPECIALLY RECOMMENDED FOR DEWATERING small size coal is the compact Low-Head Vibrating Screen equipped with End-Tensioned Deck. Screens are tensioned longitudinally. Coal is distributed evenly over all of the screening area, resulting in better dewatering efficiency. All welded parts are "stress-relieved" for lasting strength. And the Low-Head saves space and installation costs because it operates horizontally . . . requires less headroom. Sizes 3 by 6 to 6 by 16 ft. **Send for Bulletin B6330.**

1847 1947
A CENTURY OF SERVICE
to Industry
THAT MADE
America Great

. . . builds for COAL

For Longest and Best Service...

UPSON-WALTON LAYRITE (PREFORMED) ROPE



WHEREVER installation and maintenance costs are high (and that is practically everywhere) U-W Layrite wire rope can help lower them. And in almost every case where wire rope is used, Layrite will do a better job.

For rotary drilling lines...mining machine ropes...all kinds of earthmoving and excavating machinery...grab buckets, shaft hoists, cargo falls—the instances where Layrite does a better job are as broad as all industry.

Because every single strand in a U-W Layrite rope is *pre*formed to the shape it will take in the rope before it ever comes in contact with another strand, Layrite is a *permanent* rope; it's been constructed to hold its shape until the wires themselves wear out; it is safer and easier to handle . . . consequently it saves valuable time on the job in installation and saves expensive maintenance where shorter-lived rope would require re-rigging.

For best service on any job, specify *U-W Layrite Preformed, Perfection Grade.*

U-W

Established 1871

All Upson-Walton Products Available Through Your Local Upson-Walton Distributor

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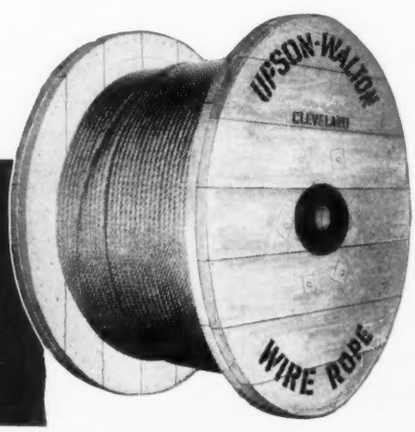

THE UPSON-WALTON COMPANY

Manufacturers of Wire Rope, Wire Rope Fittings, Tackle Blocks

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two great tires

tailored to the toughest jobs!

GOODYEAR comes through with TWO great tires to bring rock work down to rock-bottom cost.

For straight off-the-road duty in quarries and strip mines, your tire is the Hard Rock Lug—proved by years of service to be without equal in ability to "take it" and in low-cost ton delivery.

But where the haul is off AND on the road, the new double-duty Road Lug tire stands alone.

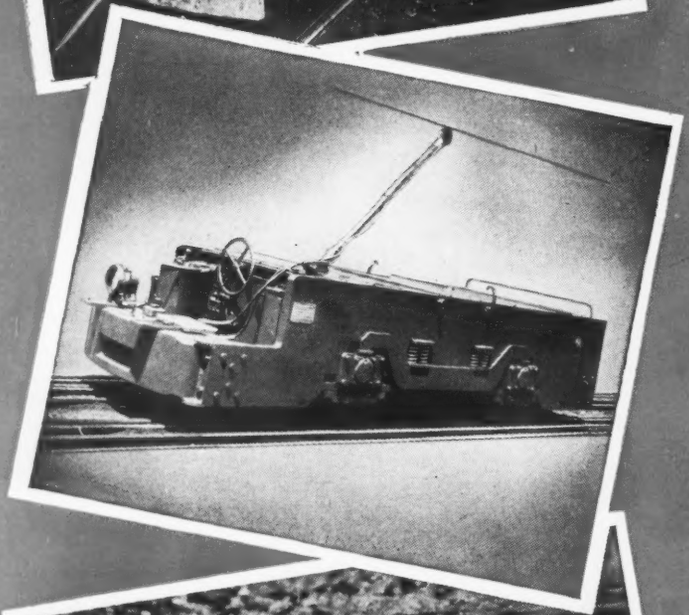
These companion tires are both built with super-strong rayon cord and extra-heavy treads—the Hard Rock Lug having massive lug bars that guard tread and sidewalls against cutting, the Road Lug riding on alternate long and short tread bars so it can dig in for traction and still last and last on highway runs.

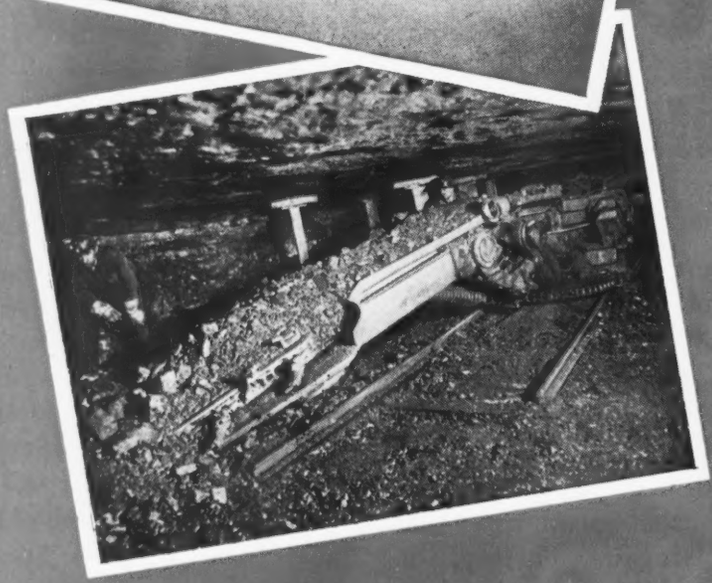
Both add up to the greatest tire values we have ever offered to cost-wise operators. It will pay off *big* to find out which of these great Goodyears best fits *your* needs.

Road Lug—T.M. The Goodyear Tire & Rubber Company

GOODYEAR

MORE TONS ARE HAULED ON GOODYEAR TRUCK TIRES THAN ON ANY OTHER KIND





SAVE 4 WAYS ON BALL ROLLER BEARINGS

Tune in . . .
TEXACO STAR THEATRE
presents the
TONY MARTIN SHOW
every Sunday night.
See newspaper for
time and station.

TEXACO
REG. T. M.

TEXACO LUBRICANTS

GREASE-LUBRICATED BALL AND ROLLER BEARINGS GET REAL COST-SAVING PROTECTION WITH *TEXACO REGAL STARFAK*

1. **SAVE BEARING REPLACEMENT COSTS:** Operators everywhere have found that bearings protected with *Texaco Regal Starfak* last much longer.

2. **SAVE MAINTENANCE COSTS:** *Texaco Regal Starfak* remains stable under operating conditions . . . resists oxidation and gum formation . . . stands up under high and low temperatures . . . gives greater protection against hot bearings. Keeps your machines out of the repair shop.

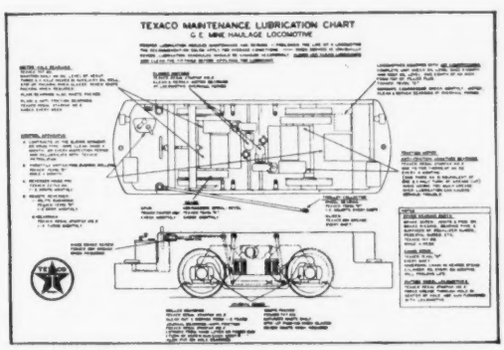
3. **SAVE LOST PRODUCTION TIME:** Machinery pays its way only when it's working. *Texaco Regal Starfak* assures smoother, more trouble-free operation . . . keeps your machines producing.

4. **SAVE LUBRICATION COSTS:** *Texaco Regal Starfak* resists leakage, separation and washout. It stays *in* the bearing . . . lasts longer. Fewer applications are needed.

In electric motors, fans, locomotives and other mining machinery — use *Texaco Regal Starfak*. For stability . . . for resistances to oxidation, leakage, separation and washout . . . you can't buy a better lubricant. Check *Regal Starfak's* cost-saving benefits above.

In heavy-duty bearings, use *Texaco Marfak* — the famous lubricant that stays in the bearing . . . gives lasting protection under heavy loads and rough service.

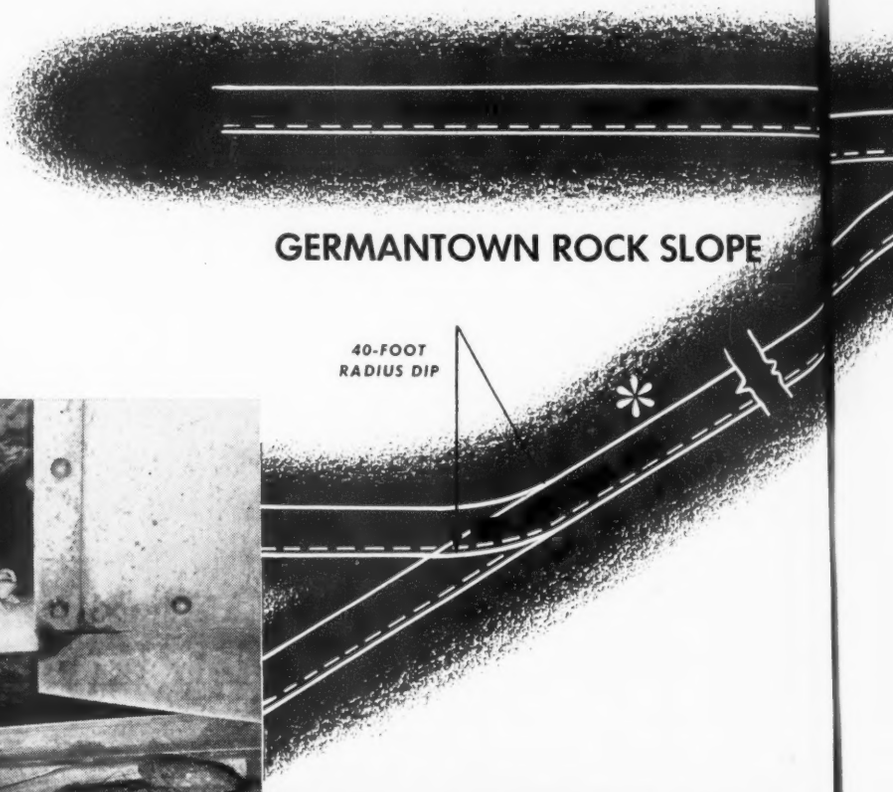
The right use of the right lubricants increases bearing life and efficiency. Let a Texaco Lubrication Engineer help you. Just call the nearest of the more than 2500 Texaco distributing plants in the 48 States, or write The Texas Company, *National Sales Division, Dept. C,* 135 East 42nd Street, New York 17, New York.



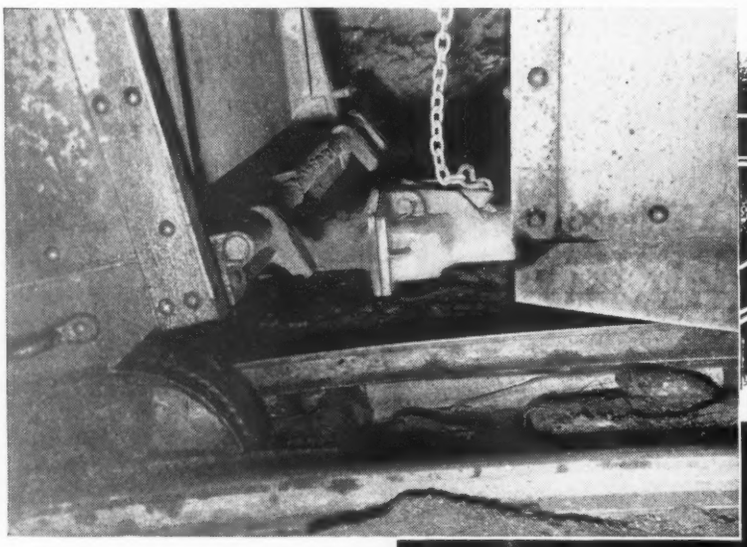
TEXACO MAINTENANCE LUBRICATION CHARTS: Leading manufacturers of underground coal mining machinery approve Texaco products for use on cutters, loaders, locomotives, etc., and have cooperated in preparing these charts. Charts show clearly where and when to use the proper Texaco lubricant. Order the charts you need by make and model of each machine.

or the Coal Mining Industry

FROM LEVEL TRACK . .



Profile view of the inside Rock Slope at Germantown Colliery. Notice the sharp breaks in grade, especially at the third-level turnout. Only with considerable flexibility in draft gear mountings can more than one car successfully negotiate such dips and knuckles.



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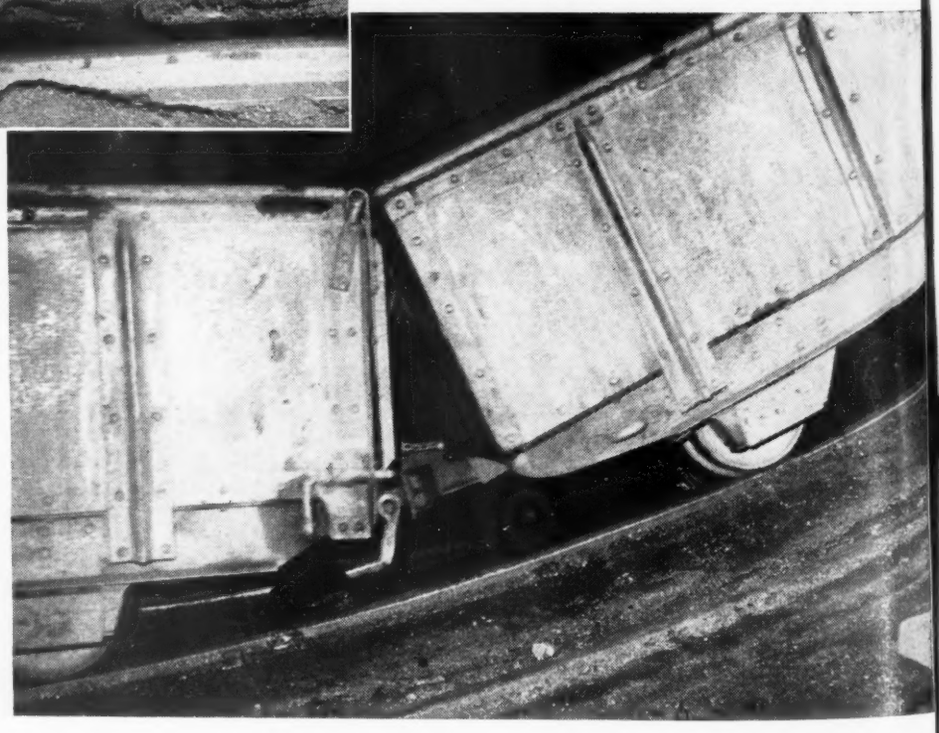
Close-up of two mine cars on the knuckle of the inside Rock Slope at Germantown Colliery.



*

Two mine cars on a dip at Germantown Colliery. O-B Couplers permit the cars to ride the track without binding at the coupler faces.

. . . TO 40% GRADE

O-B Automatic Couplers negotiate sharp breaks in grade at Germantown Colliery

Of The Raven Run Coal Company,
Subsidiary of Jeddo-Highland Coal Company

Dips and knuckles with radii varying from 40 to as little as 25 feet are not conditions ordinarily found on any mine haulage track. Yet O-B Automatic Couplers enable mine cars to negotiate such sharp breaks in grade at Germantown Colliery, an important anthracite property of the Raven Run Coal Company. A flexible draft gear mounting permits fourteen degrees of vertical swing—more than enough to meet Germantown's requirements.

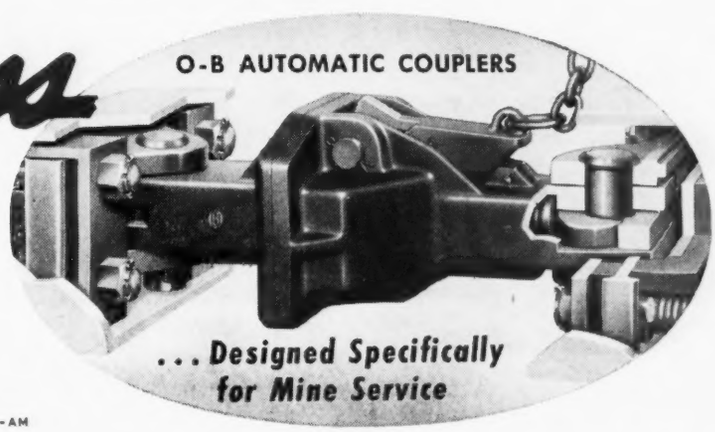
An inside slope operating on two different levels, Germantown Colliery keeps its cars on the move, shifting them from level to level as needed. Two-hundred fifty large all-steel cars are now in service and all of them are equipped with O-B Couplers. In addition to their operational flexibility, Germantown believes the couplers are largely responsible for reducing derailments 95 per cent. Car maintenance has also been kept at a minimum—not more than $60 has been spent on repair in the last six months.

If you are considering the purchase of new mine cars, don't fail to investigate the O-B Automatic Coupler—the coupler that is designed specifically to meet mine operating conditions. Write for details as to how they may be adapted to your haulage system. They will help you to move more coal at less cost per ton.

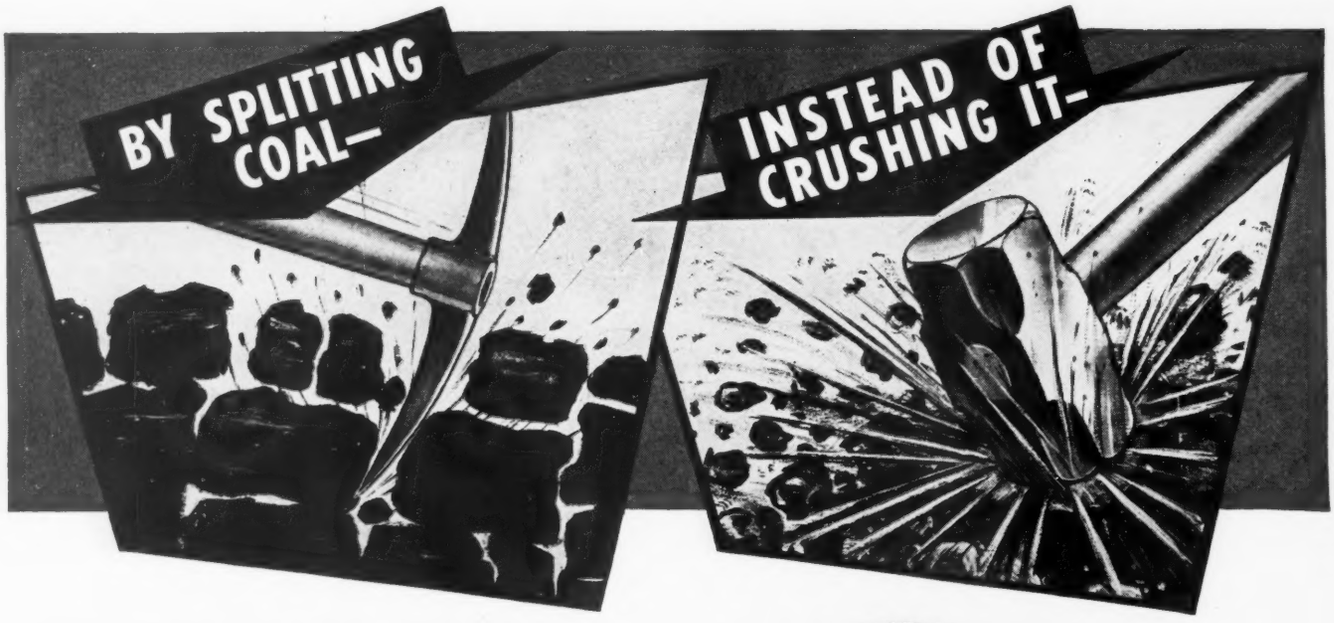
Ohio Brass

MANSFIELD, OHIO

Canadian Ohio Brass Co., Ltd.,
Niagara Falls, Ontario



2759-AM

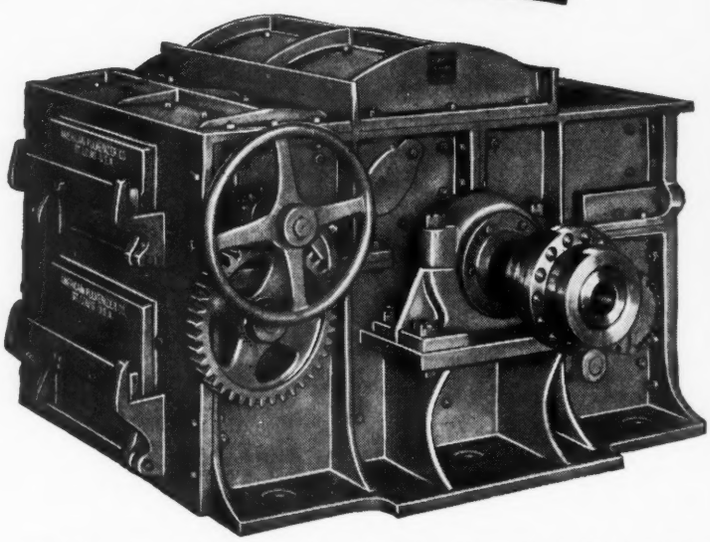


AMERICANS Minimize Fines and Produce Uniform Sizing

Nothing could better illustrate how American Rolling Ring Crushers give better control of fines, than the example of splitting coal with a pick-axe contrasted to crushing it with a sledge hammer.

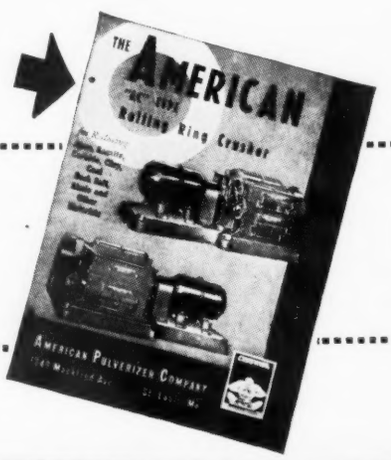
America's patented shredder ring action reduces ROM by cleavage impact rather than blunt shattering force. This makes possible a high tonnage rapid reduction while the rotor is revolving at slow power-saving speeds—resulting in less maintenance, minimum fines, uniform sizing and no oversize.

Whether your crushing is a one-step operation or a circuit, Americans maintain uniform sizing regardless of the range of reduction.



The American AC Crusher is designed and built for long dependable service. The entire frame is of sectional design with easy access to crushing chamber, lined with carbon and manganese steel sections.

MANY OPERATORS HAVE FOUND THE ANSWER IN HERE. Send for this free bulletin on coal crushing data and crusher specifications.



Only Americans have the splitting action of the Shredder Rings. Each shredder ring (shown at left) has 20 cutting edges. Rings revolve on individual shafts, free to deflect from tramp iron—eliminating the bother of shear pins or conventional safety devices.

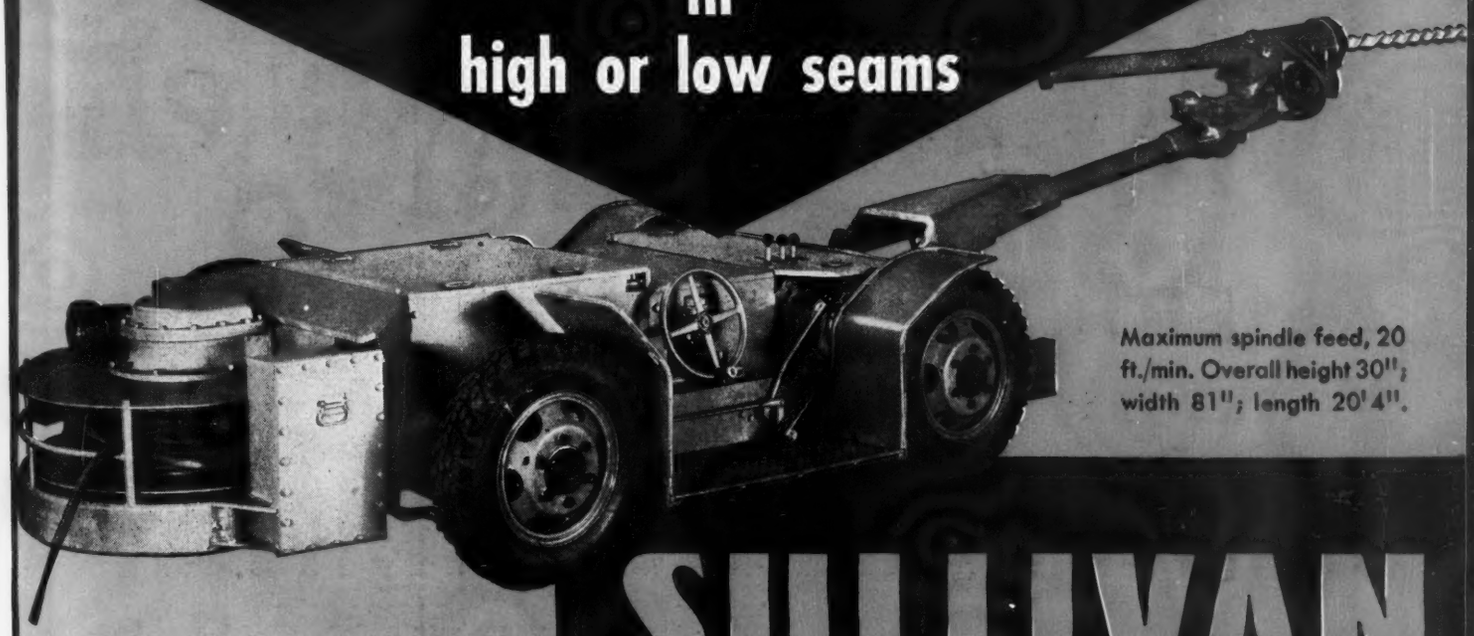
American PULVERIZER COMPANY

Originators and Manufacturers of Ring Crushers and Pulverizers

1119 Macklind Ave.
St. Louis 10, Mo.

Speedy Drilling

that reduces costs in high or low seams



Maximum spindle feed, 20 ft./min. Overall height 30"; width 81"; length 20'4".

SULLIVAN

CD-22 COAL DRILL

- Pre-selected drilling speeds
- Hydraulic Control
- Extremely mobile, flexible control

Highly maneuverable . . . rapidly positioned. Automatic cable-reel is hydraulically operated. The CD-22 drills holes up to 9 feet deep at any height up to 5½ feet above mine floor. When equipped with special, long boom the maximum height is 7 feet.

JOY LOADERS

Load it out more quickly... at Lower Cost!

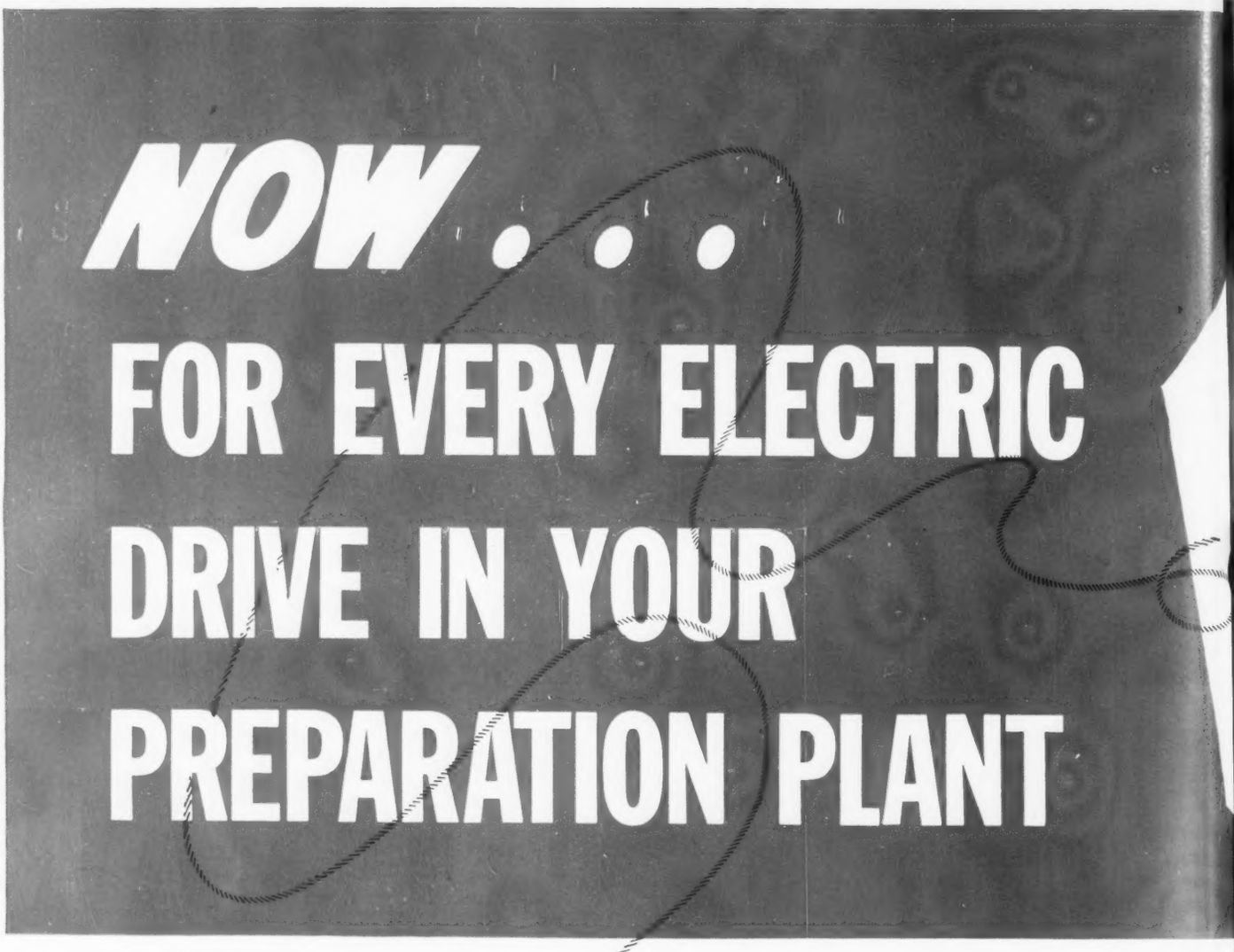
Designed for high production in low veins, the Joy 14-BU has an approximate capacity of 5 tons per minute.

Consult a Joy Engineer

SULLIVAN DIVISION

JOY MANUFACTURING CO.

GENERAL OFFICES: HENRY W. OLIVER BLDG., PITTSBURGH, PA.



TRI CLAD EXTRA PROTECTION

In 1940, the first Tri-Clad* motor made big news in the coal industry. More horsepower-per-frame-size, trim, compact appearance—these were important features. But it was the extra protection we built into the rugged Tri-Clad motor design that really sold more than 1,220,000 Tri-Clad motors.

Today, Tri-Clad is a "family" name. Tri-Clad protection is available in almost every type of motor a coal preparation plant might use—open (dripproof) motors, totally enclosed motors, wound-rotor motors, gear-motors, vertical motors. This means you can now gain the advantages of Tri-Clad extra protection on *all* of your important drives.

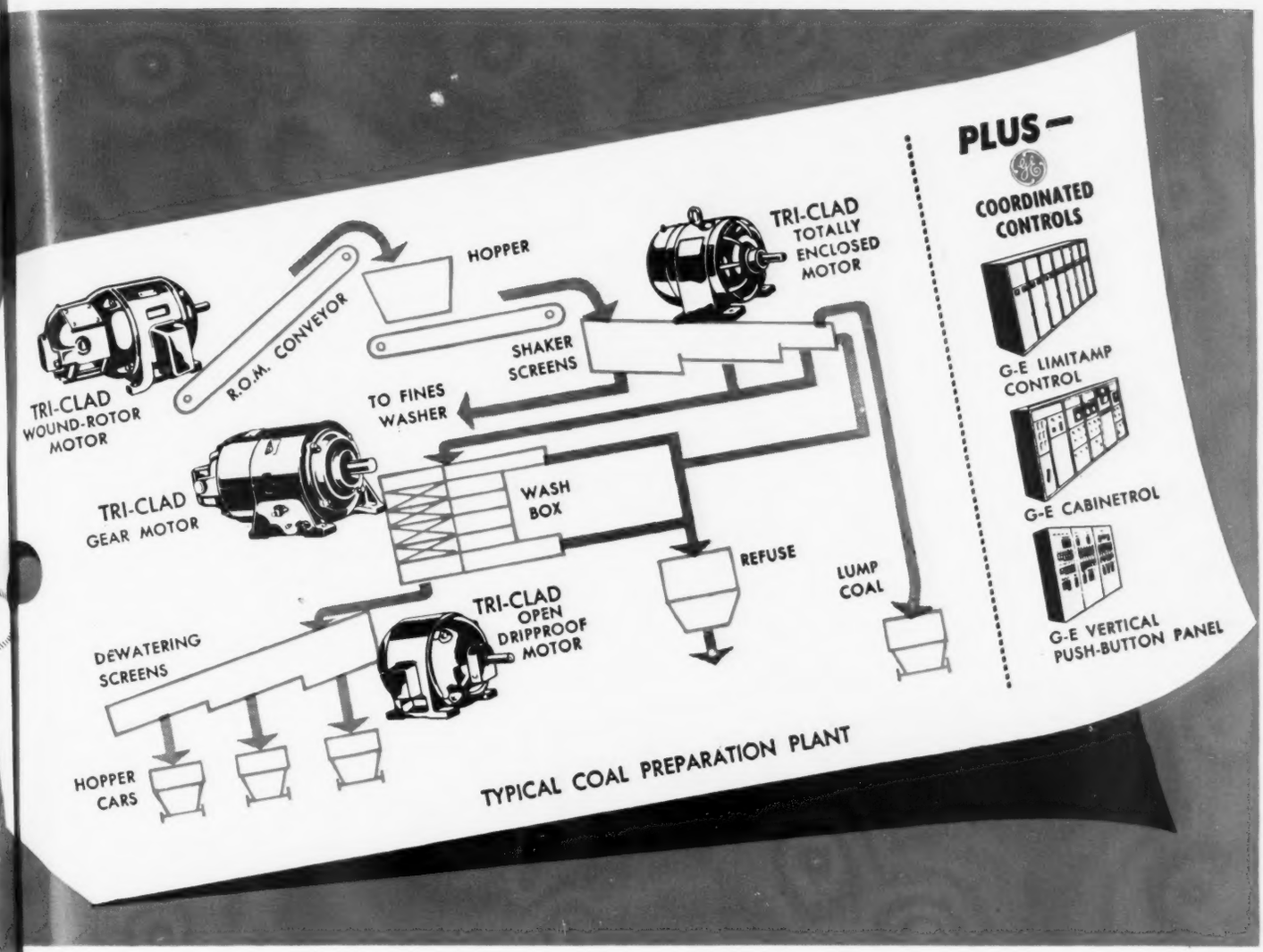
Reg. U. S. Pat. Off.

EXTRA PROTECTION . . . AGAINST PHYSICAL DAMAGE!

A rigid cast-iron frame and end shields to protect vital motor parts from external abuse. Strong resistance of cast iron to corrosion. Tight, metal-to-metal fits between end shields and frame.

EXTRA PROTECTION . . . AGAINST ELECTRICAL BREAKDOWN!

Motor windings of Formex* wire, together with improved insulating materials, to reduce the chances of electrical failure. Large, free-flowing air passages to dissipate heat quickly.



EXTRA PROTECTION . . . AGAINST OPERATING WEAR AND TEAR!

Improved bearing design to retain lubricant, keep out dirt. Long, close-running fits to keep foreign matter from entering motor along shaft.

NOW . . . AN EVEN TOUGHER TRI-CLAD! Newest addition to the Tri-Clad motor family is the Tri-Clad totally enclosed, fan-cooled motor. It meets the Federal Code requirements for dust-tight tipple motors, with these extra protection features:

- *A cast-iron, double-wall frame which completely encloses and protects the windings and punchings*
- *A non-shrinking compound around motor leads which protects motor interior from dust and moisture*
- *A rotating labyrinth seal which further protects the motor interior from damage by foreign matter*

Make it an "ALL G-E"

CO-ORDINATED ELECTRIC DRIVE!

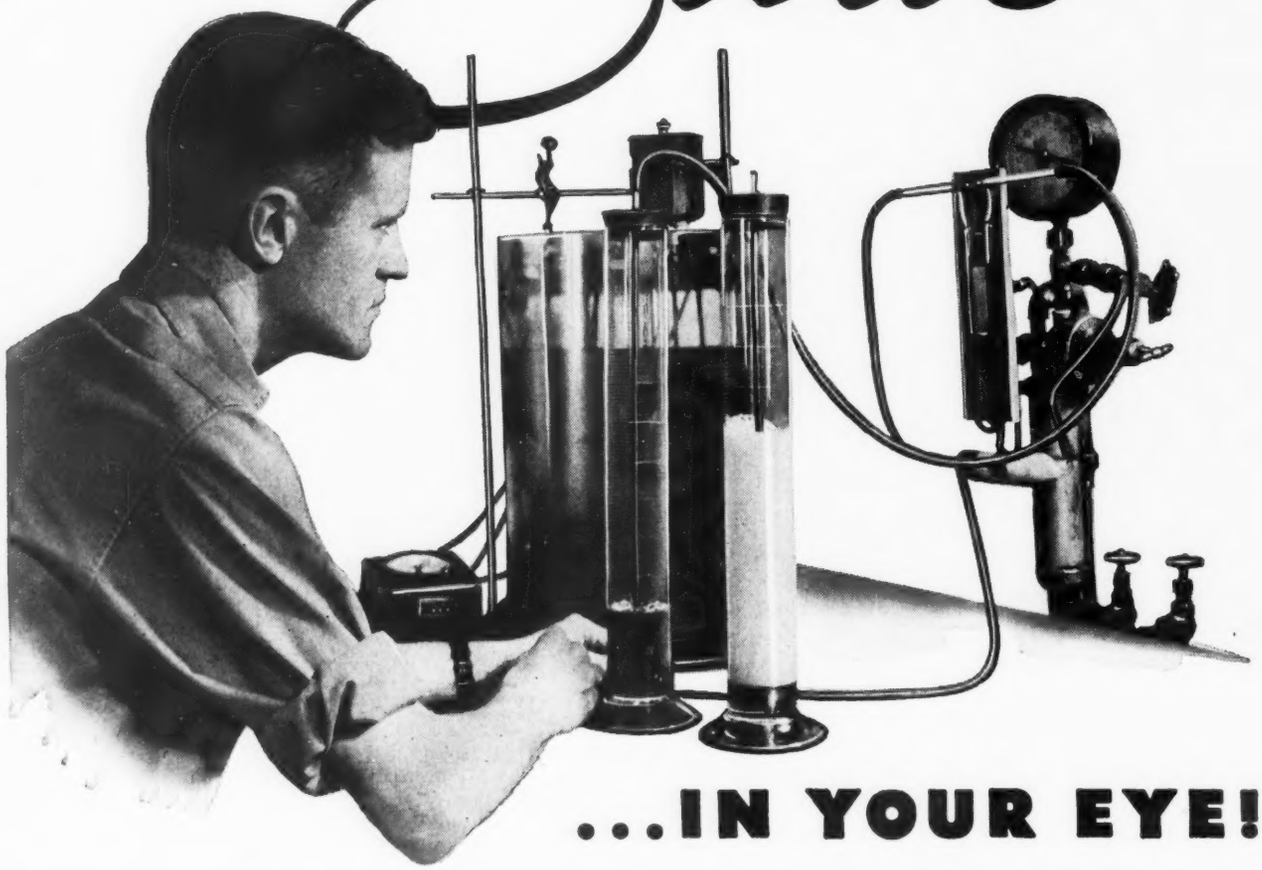
Preparation plant operators who specify General Electric co-ordinated electric drives avoid the endless details involved in ordering and securing delivery of all the many components in a modern electric drive. And they know they're getting a soundly engineered system to meet a specific set of conditions.

A co-ordinated General Electric "package" drive includes G-E "packaged" unit substations, G-E Cabinetrol for low-voltage motor control, G-E Limitamp for high-voltage motor control, Tri-Clad motors for drives where protection is important, G-E cable, and G-E push-button installations for centralized control. Why not call in a General Electric coal mining specialist to discuss your electric drive problems soon? *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

Motors and Controls
FOR THE
COAL MINING INDUSTRY

GENERAL ELECTRIC

HERE'S *Suds*



...IN YOUR EYE!

The suds very much in your eye as you look at the photograph above is lubricating oil which foams badly and, if used in valuable equipment, constitutes a hazard to positive lubrication, which can increase maintenance costs.

At Sinclair Laboratories, skilled technicians, like the one shown above, study and test lubricating oils constantly for foaming characteristics. Through research in the study of additives, Sinclair provides anti-foam characteristics and assures positive lubricating film plus maximum heat dissipation for protection against wear and failure.

Through such painstaking research, Sinclair maintains production of lubricants of consistent high quality. Sinclair Laboratories and outstanding research are behind the dependable performance of all Sinclair Lubricants for Industry.

Sinclair Automotive Lubricants for Strip Mining

POSITIVE LUBRICATION — MAXIMUM POWER

OPALINE MOTOR OIL

OPALINE TBT OIL
(For severe service)

TENOL (Heavy Duty—For Diesels)

OPALINE GEAR LUBRICANTS

OPALINE CHASSIS LUBRICANT

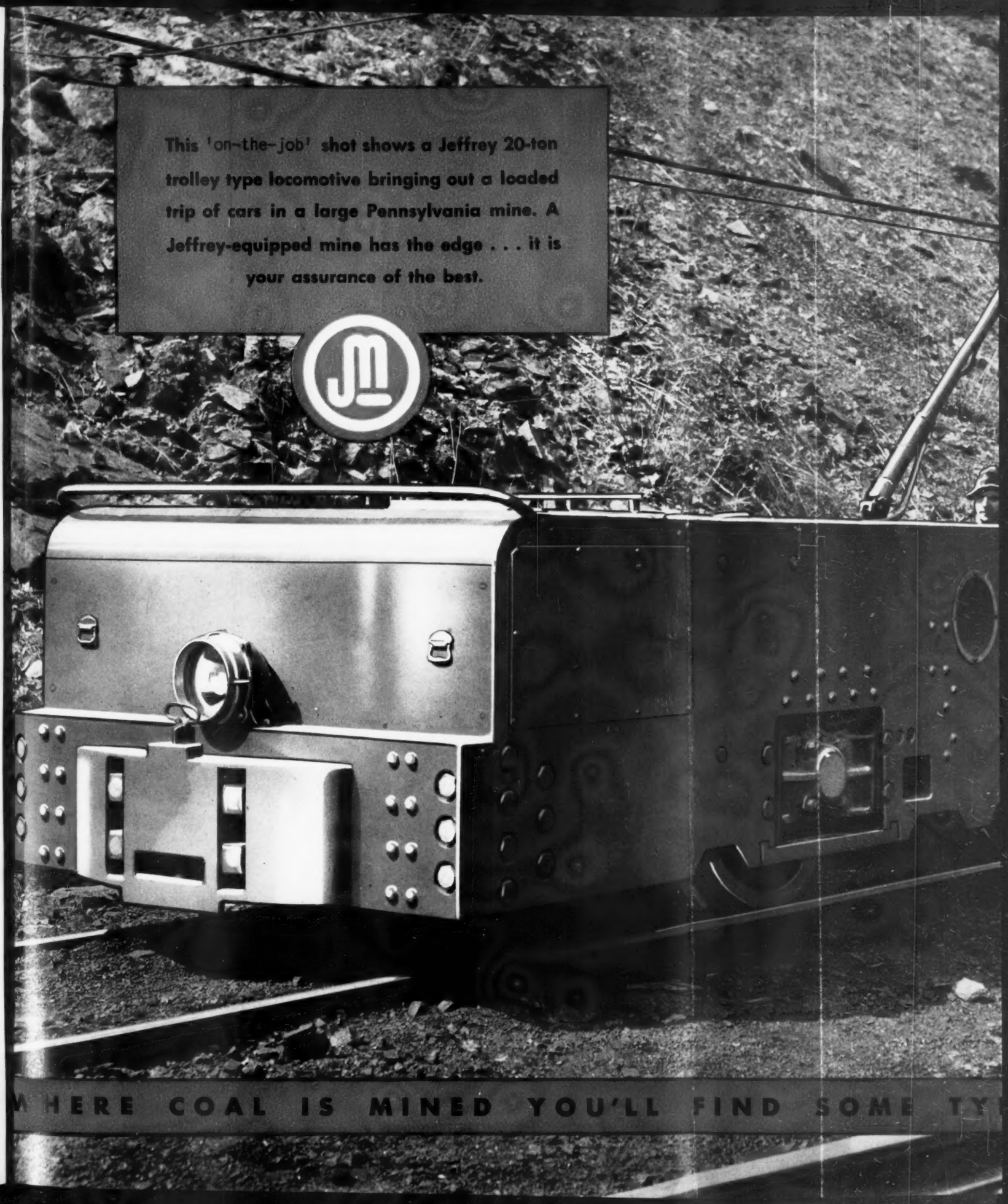
SINCOLUBE (For Wheel Bearings)

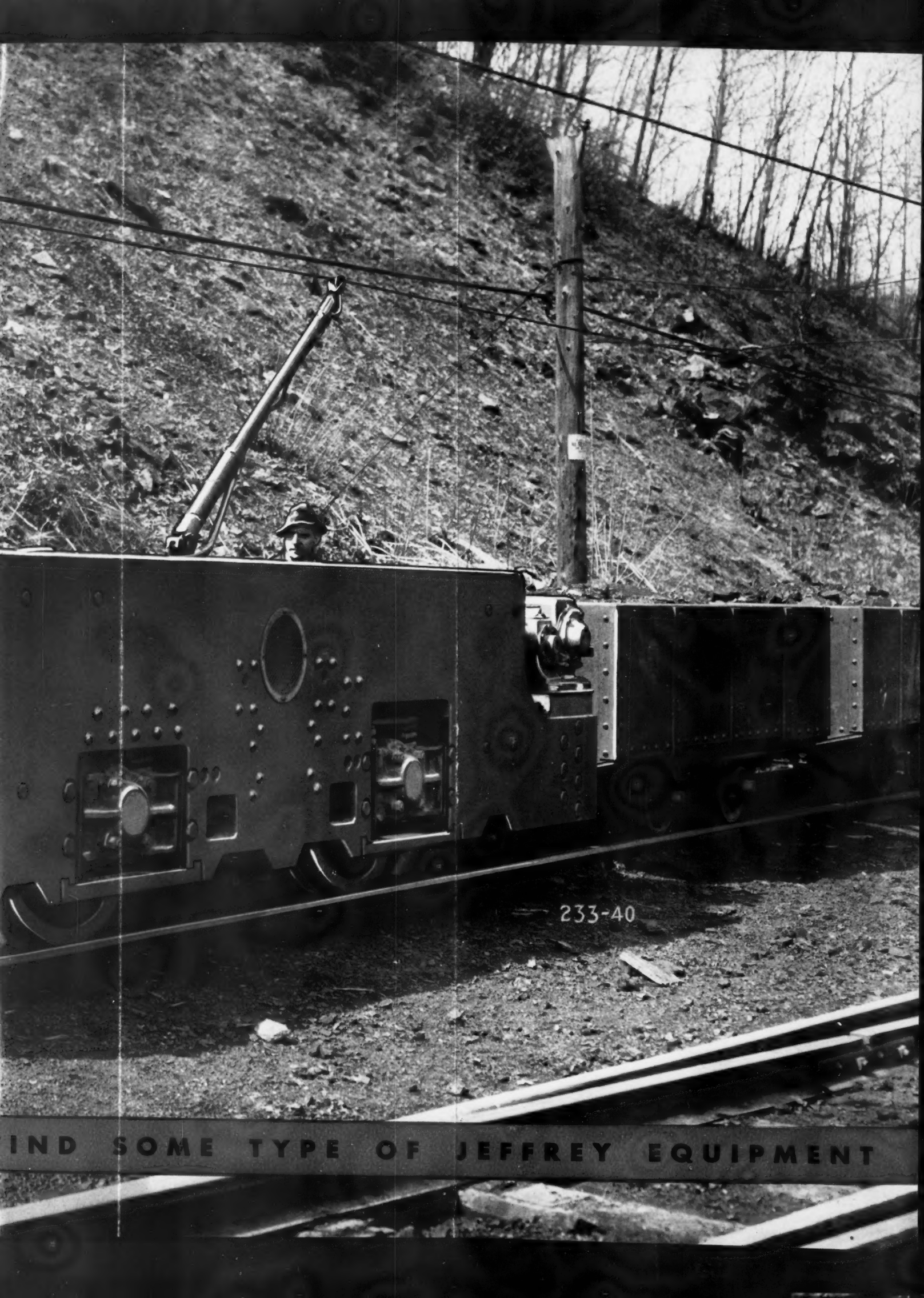
SINCLAIR REFINING COMPANY • 630 FIFTH AVENUE, NEW YORK 20, N. Y.

SINCLAIR

Lubricants for Industry

FINEST CRUDES + EXPERT RESEARCH and MANUFACTURING CONTROL = OUTSTANDING PERFORMANCE


This 'on-the-job' shot shows a Jeffrey 20-ton trolley type locomotive bringing out a loaded trip of cars in a large Pennsylvania mine. A Jeffrey-equipped mine has the edge . . . it is your assurance of the best.
WHERE COAL IS MINED YOU'LL FIND SOME TY



IND SOME TYPE OF JEFFREY EQUIPMENT

DESI
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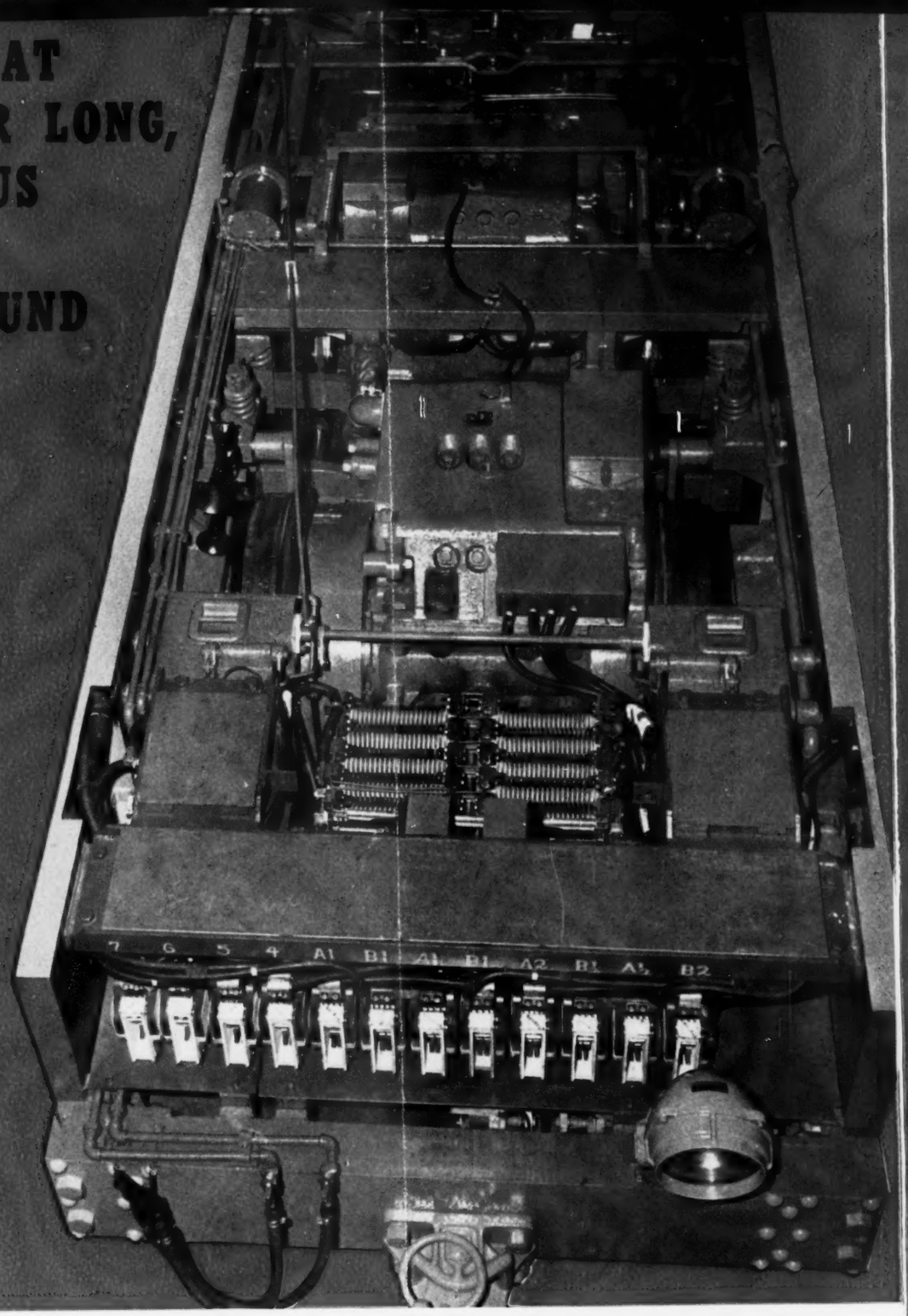
DESIGN THAT MAKES FOR LONG, CONTINUOUS SERVICE UNDERGROUND



JEFFREY *Haulage* LOCOMOTIVES

Here is an inside shot of a 20-ton air brake Jeffrey haulage locomotive. Note the compact yet accessible design and the rugged construction throughout. These are points of interest to all operators looking for dependable main line haulage.

Jeffrey locomotives, haulage or gathering, have a wide acceptance under all kinds of operating conditions and there is a selection of types to meet practically every transportation need.

After all, the service your locomotive renders depends largely upon its design, and construction and the "know-how" of the organization building it. Jeffrey has the experience, engineering skill and the facilities to help you solve difficult haulage problems.

GEN

Jeffr
service
coal mi
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★

JEFFREY
FOR COA

- BLOW
- CON
- CRUS
- CUTT
- DRILL
- FANS
- JIGS
- LOAD
- LOCO
- SCRE

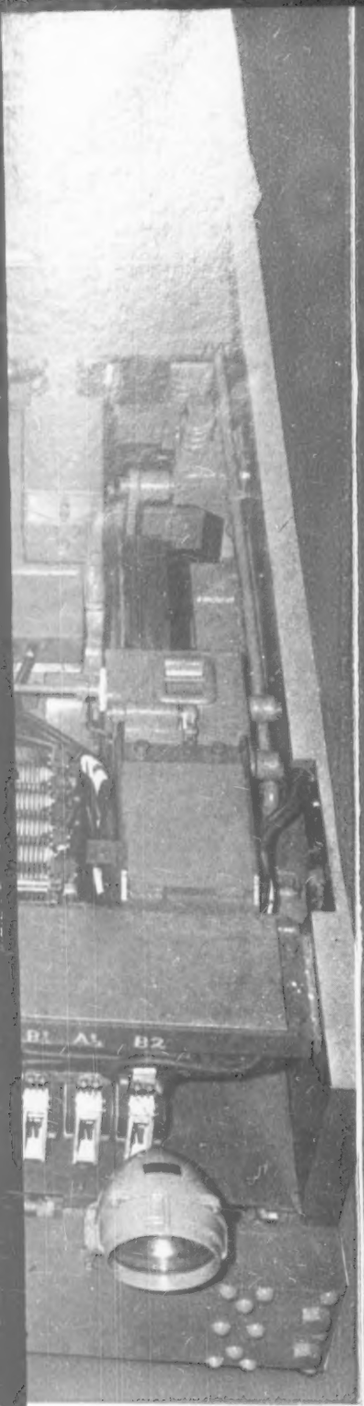
THE

91

Sales Offices:

Service Station

Foreign Plants:



OTIVES

actically every

comotive renders
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has the experi-
the facilities to
oage problems.

GENUINE *Jeffrey* RENEWAL PARTS

Jeffrey service to the coal mines is complete

★

JEFFREY EQUIPMENT FOR COAL MINES . . .

- BLOWERS
- CONVEYORS
- CRUSHERS
- CUTTERS
- DRILLS
- FANS
- JIGS
- LOADERS
- LOCOMOTIVES
- SCREENS

THE JEFFREY MANUFACTURING COMPANY

Established in 1877

912-99 NORTH FOURTH STREET, COLUMBUS 16, OHIO

Sales Offices:	Baltimore Birmingham Boston Buffalo	Chicago Cleveland Cincinnati Detroit	Denver Harlan Houston Huntington	Milwaukee New York Philadelphia Pittsburgh	Scranton St. Louis Salt Lake City
Service Stations:	Pittsburgh Harlan, Ky.	Birmingham St. Louis	Logan-Beckley W. Va.	Scranton	
Foreign Plants:	Jeffrey Mfg. Co., Ltd. Montreal, Quebec	British Jeffrey-Diamond, Ltd. Wakefield, England	Jeffrey-Galion (Pty), Ltd. Johannesburg, S. A.		

Are your $ conveyors dribbling away $$?

There are all of six ways that the wrong conveyor lubricants can cut into your profits.

1. High consumption through leakage
2. Excessive labor for lubricating
3. High consumption of power
4. Frequent idler maintenance
5. Excessive belt wear
6. Production slowdown

Some of these profit-whittlers may slip by unnoticed for a long time. They may vary with the seasons or the type and age of equipment used.

If you suspect that any of them is lurking in your plant there's a sure and simple way to root it out. Put a Standard Oil Lubrication Engineer on the trail. He will study equipment conditions. He has a line of Superla Greases in a wide range of grades for conveyor lubrication. With the right grade of Superla which he recommends, you're sure that hard-won profits are not being dribbled away.

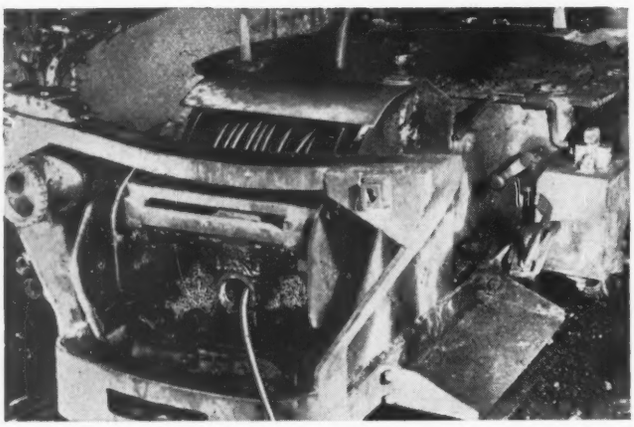
Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.

SUPERLA
GREASES

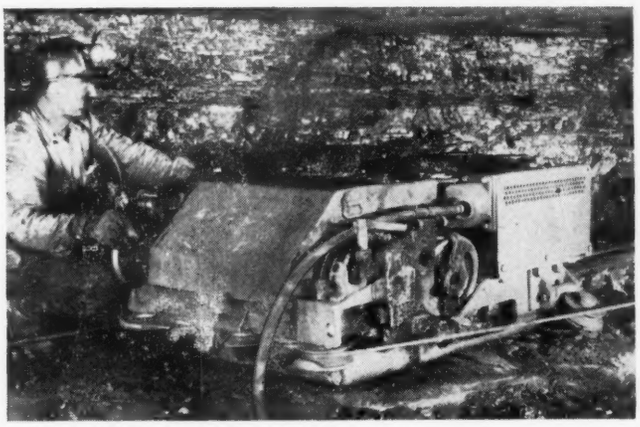
STANDARD OIL COMPANY (INDIANA) STANDARD SERVICE

For greater mine

USE THESE



YOU CAN REEL IT AND UNREEL IT FOR YEARS. Amerclad's great flexibility makes it popular for gathering reel locomotives of all types.

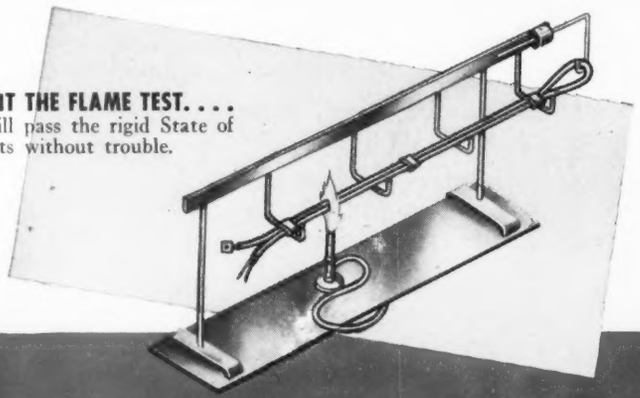


YOU CAN SMEAR IT WITH GREASE. The Neoprene cover was engineered to resist oil, grease, water and mine acids.

YOU CAN DRAG IT OVER ROCKS. The cover is as tough as truck tires . . . will stand scuffing and scraping of coal, slate or sharp rock.

YOU CAN WEAR IT AROUND YOUR NECK. Even perspiration does not damage the synthetic rubber cover.

YOU CAN GIVE IT THE FLAME TEST. . . .
and Amerclad will pass the rigid State of Pennsylvania tests without trouble.



safety...

APPROVED U·S·S AMERCLAD CABLES

NEW AMERCLAD TWIN PARALLEL MINING MACHINE CABLE WITH FLEXIBLE GROUND STRAND

This cable was especially designed to assure maximum safety to the men who work on or around rubber tired mining machines. It has a flexible ground strand between the two conductors which provides a positive ground for the machine. The ground strand also protects any workman who should accidentally penetrate the cable with a sharp tool.

AMERCLAD TYPE GPS SHOVEL CABLE

Each of the three conductors is insulated with an extra-heavy wall of amerite 30% performance test rubber compound and is then covered with a rubber-filled tape. Over this is applied a type PS shielding tape of semi-conducting rubber which affords protection to workmen who are constantly handling the cable. The three ground wires in the valleys between conductors add further protection in case any conductor is damaged in operation. All interstices are filled with rubber compound and the assembly is covered with two layers of Neoprene rubber with a reinforcement of seine twine between them. This construction results in great flexibility, toughness and resistance to abrasion, oil, water and mine acids.

Write for Amerclad Booklet—

Whatever the job, you can do it better and safer with U·S·S Amerclad Portable Power Cables. They are obtainable for low or high voltages in every needed size or type.

AMERICAN STEEL & WIRE COMPANY

Cleveland, Chicago and New York

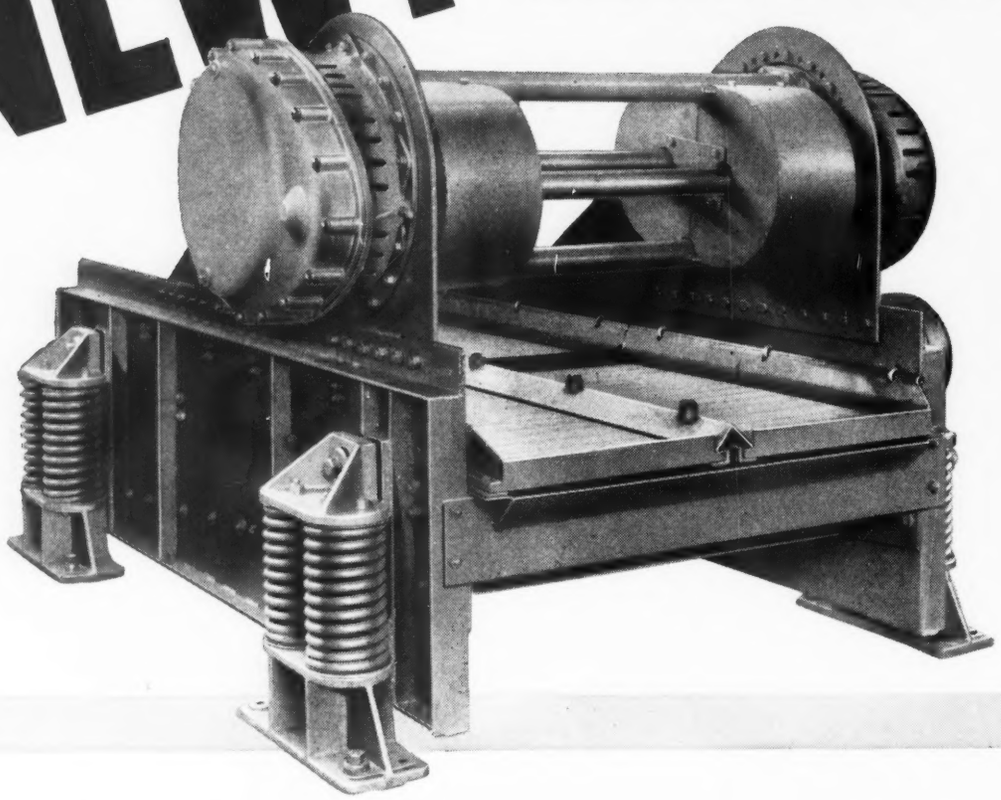
Columbia Steel Company, San Francisco, *Pacific Coast Distributors*
Tennessee Coal, Iron & Railroad Company, Birmingham, *Southern Distributors*
United States Steel Export Company, New York

UNITED STATES STEEL

AMERICAN STEEL & WIRE COMPANY · USS · AMERICAN ELECTRICAL WIRE AND CABLE · UNITED STATES STEEL

U·S·S AMERCLAD CABLE

NEW! THE ROBINS DEWATERIZER



Leaves as little as 12% surface moisture on coal...even in sizes as small as ⅛" to 0"

There's a new, low-cost way to dewater coal these days!

That is to use a Robins Dewaterizer—the answer of Robins engineers to the problem of removing surface moisture quickly and effectively from any required tonnage and gallonage of feed in sizes as large as 5".

Operators who have already installed this revolutionary new device report that it leaves as little as 12% surface moisture on coal as small as ⅛" to 0"—even less on larger sizes.

Efficiency of the new Robins Dewaterizer is due to the combination of an exclusive elliptical motion and a radically different type of dewatering surface.

Coal is moved *uphill* by three motions—horizontal, vertical and rotary. Horizontal motion keeps coal moving toward the discharge end. Vertical motion promotes dewatering. Rotary motion prevents loss of fines.

The dewatering surface is a special flat deck of stainless steel rods spaced as close as required—down to and including ¼ millimeter. Depressions along either side of projecting dams accelerate drainage of water.

Add to this the triple economy which the new Robins Dewaterizer makes possible! First cost is surprisingly moderate when compared with other devices. Operating costs are unusually low. Maintenance costs are practically negligible.

Remember, too, that the new Robins Dewaterizer has been fully tested on day-to-day runs in actual plants. For complete information, write Robins today.

ROBINS DEWATERIZER

Send now for your copy of Robins Bulletin 129. It fully illustrates and describes the new money-saving Robins Dewaterizer.

ROBINS CONVEYORS DIVISION
Hewitt-Robins Incorporated, Passaic, N.J.

HEWITT-ROBINS INCORPORATED HR

CARDOX Mine-Fire CAR

ENGINEERED TO PROVIDE MAJOR PROTECTION AGAINST

DEEP-SEATED COAL FIRES

OIL FIRES

ELECTRICAL FIRES

The Cardox Mine-Fire Car combines in a single mobile unit facilities for (1) driving out smoke and reducing the temperature in a room or passageway, (2) sealing the surface around deep-seated coal fires with "CARDOX FIRE COAT," (3) quickly extinguishing oil and electrical fires, with absolutely no damage by the extinguishing medium to the equipment involved, (4) "CARDOX FIRE COAT" provides a quick, effective method for creating temporary, rigid fireproof seals in burning areas, (5) provides CO_2 for inerting the atmosphere to prevent an explosive concentration of methane gas.

Full details on the size, design and fire-fighting efficiency of this specialized Cardox Mine-Fire Car are available in a bulletin just off the press. Write for your copy today.

CARDOX CORPORATION

BELL BUILDING • CHICAGO 1, ILLINOIS

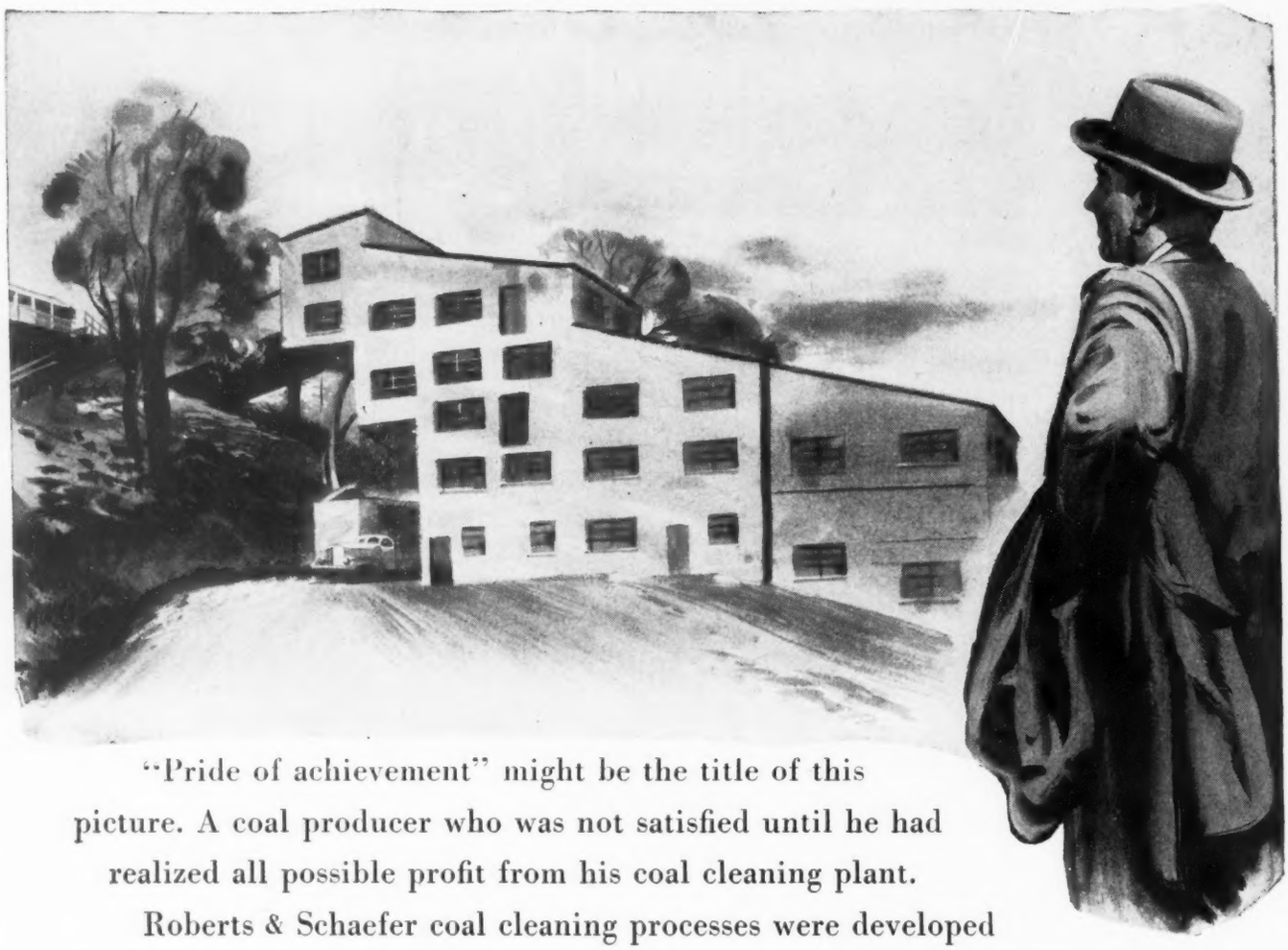
District Offices: New York . Philadelphia . Library, Pa. . Pittsburgh . Meadowview, Va. . Harper, W. Va. Camden-on-Gauley, W. Va. . Cleveland . Detroit . Evansville, Ind. . Benton, Ill. . St. Louis Louisville, Col. . San Francisco . Los Angeles . San Diego

Drives out smoke

Seals up deep-seated coal fires

Smothers oil fires fast

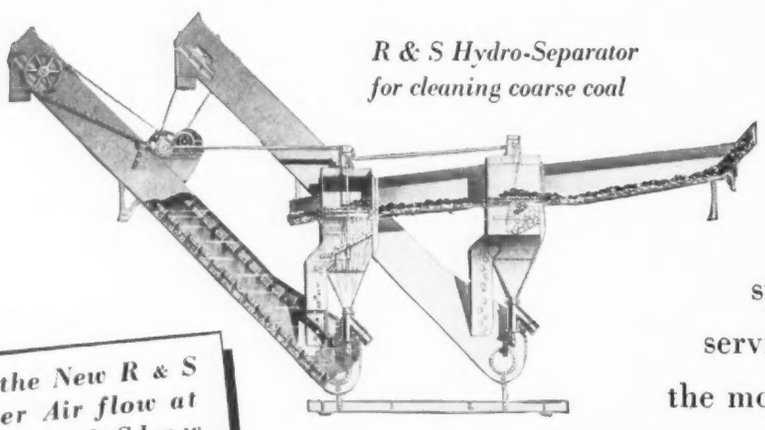
HERE IS A MAN WHO KNOWS HOW TO MAKE HIS COAL PAY —



"Pride of achievement" might be the title of this picture. A coal producer who was not satisfied until he had realized all possible profit from his coal cleaning plant.

Roberts & Schaefer coal cleaning processes were developed for this man. The Hydro-Separator for coarse coal 6″ x ¼″, Hydrotator for fine coal and the Stump Air Flow for dry cleaning. These units and Roberts & Schaefer specialized engineering service combine to produce the most profit from mine output.

Ask about them today.



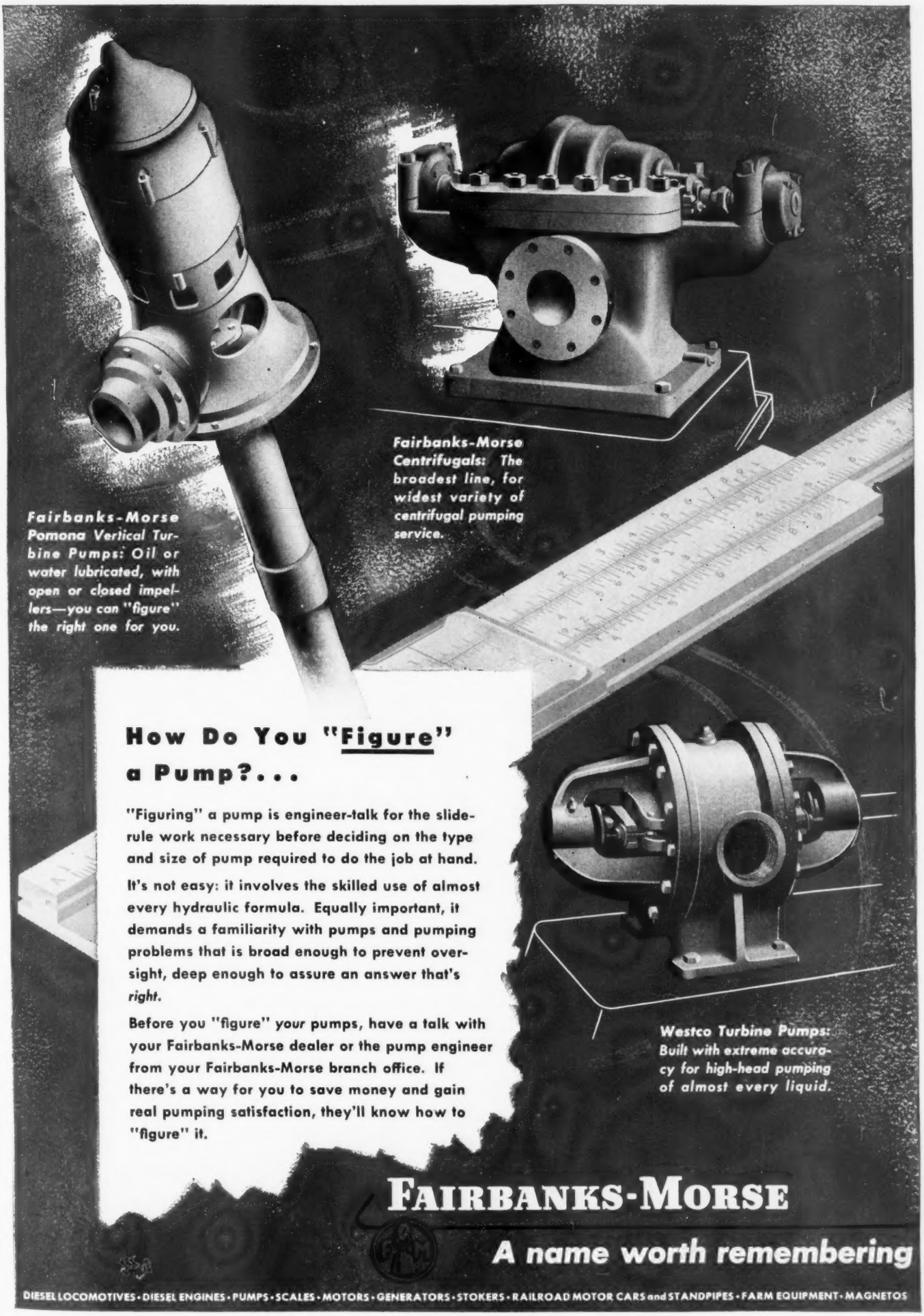
R & S Hydro-Separator for cleaning coarse coal

See the New R & S Super Air flow at the Coal Show Booth No. 1000

ROBERTS and SCHAEFER CO.

307 NORTH MICHIGAN AVENUE • CHICAGO 1, ILLINOIS

2221 Oliver Building, Pittsburgh 22, Pa. • P. O. Box 370, Huntington, W. Va.



Fairbanks-Morse Pomona Vertical Turbine Pumps: Oil or water lubricated, with open or closed impellers—you can "figure" the right one for you.

Fairbanks-Morse Centrifugals: The broadest line, for widest variety of centrifugal pumping service.

How Do You "Figure" a Pump?...

"Figuring" a pump is engineer-talk for the slide-rule work necessary before deciding on the type and size of pump required to do the job at hand.

It's not easy: it involves the skilled use of almost every hydraulic formula. Equally important, it demands a familiarity with pumps and pumping problems that is broad enough to prevent oversight, deep enough to assure an answer that's *right.*

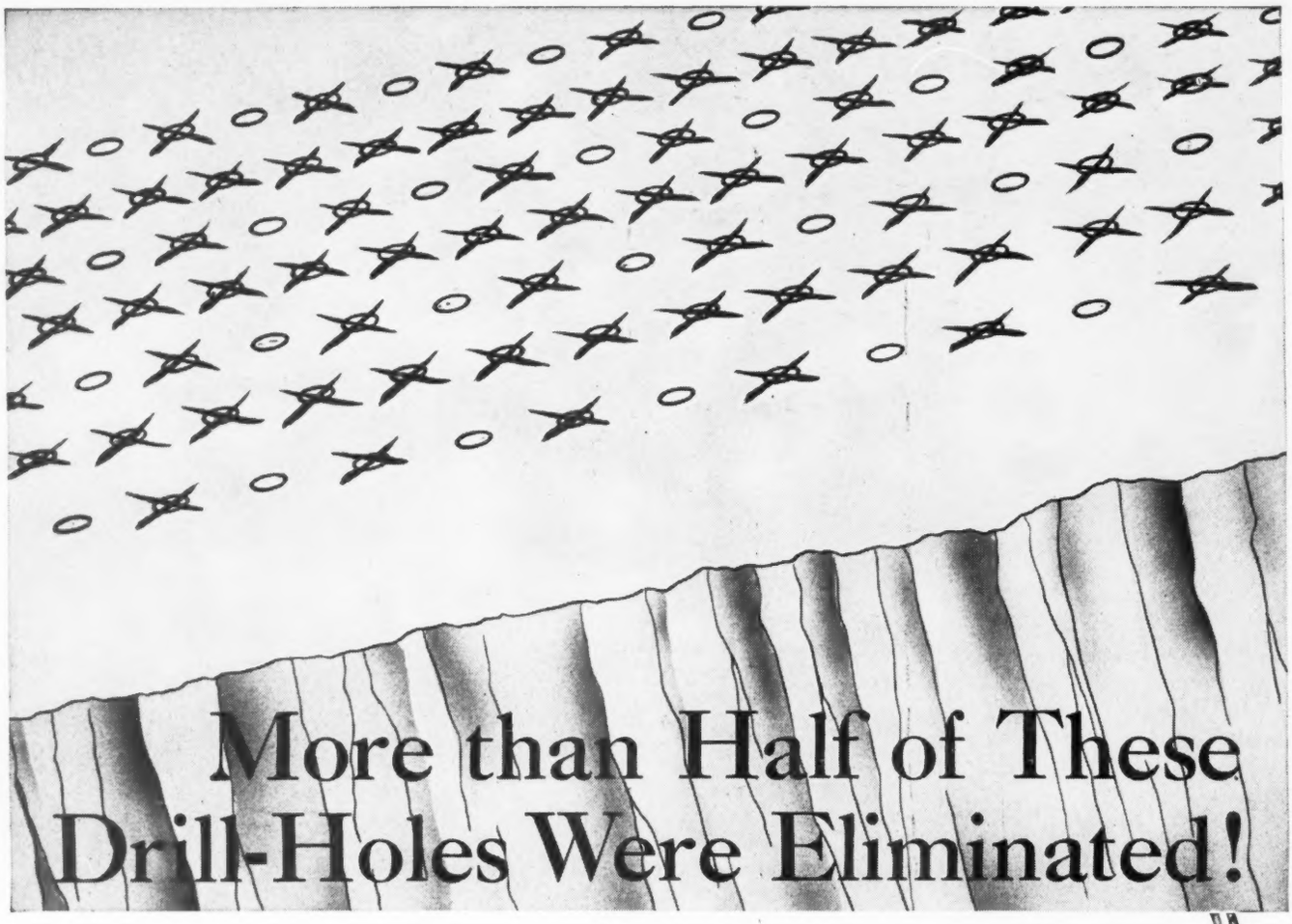
Before you "figure" *your* pumps, have a talk with your Fairbanks-Morse dealer or the pump engineer from your Fairbanks-Morse branch office. If there's a way for you to save money and gain real pumping satisfaction, they'll know how to "figure" it.

Westco Turbine Pumps: Built with extreme accuracy for high-head pumping of almost every liquid.

FAIRBANKS-MORSE

A name worth remembering

DIESEL LOCOMOTIVES • DIESEL ENGINES • PUMPS • SCALES • MOTORS • GENERATORS • STOKERS • RAILROAD MOTOR CARS and STANDPIPES • FARM EQUIPMENT • MAGNETOS



More than Half of These Drill-Holes Were Eliminated!

This story will sound almost unbelievable to many quarry, construction and mining men accustomed to ordinary methods of blasting.

A reduction of over 50% in drilling costs and dynamite costs! That's the experience of a well-known Tennessee limestone quarry—due to using the original Rockmaster Blasting System developed by Atlas.

This quarry had made a practice of spacing drill holes on 4-foot centers. Hundreds of holes had been drilled in advance for seven-row shots. When the Rockmaster system was introduced, our representative recommended loading only every other hole and every second row. His suggestion was adopted, as shown in the diagram. Over 70% of the holes already drilled were left unloaded!

Results were astounding. Breakage was *exceptionally good*, better than had ever been obtained before! Future plans call for drilling holes on 8-foot centers (or even greater.)

Of course, results vary according to the problems of the job. But this is no isolated case of economy. Hundreds of engineers are praising the Rockmaster system for greatly increased fragmentation of burden, for increasing production and cutting costs. At the same time, Rockmaster cuts down on objectionable noise and vibration in many instances.

The Rockmaster system is based on millisecond delays between holes, accurately controlled by Rockmaster electric detonators. Explosives and methods of loading are a part of the system, so that each shot is tailor-made to suit requirements.

Call in the Atlas representative and ask him what Rockmaster can do for *you*.

ROCKMASTER GIVES YOU THE GREATER SAFETY OF MANASITE DETONATORS

Less Bark . . .
More Bite

Manasite: Reg. U.S. Pat. Off. "ROCKMASTER"—Trade Mark

ATLAS EXPLOSIVES
"Everything for Blasting"

CHEMICALS ATLAS EXPLOSIVES

ATLAS POWDER COMPANY, Wilmington 99, Del. • ***Offices in principal cities*** • ***Cable Address—Atpowco***

Where grounding of portable equipment is required, it's safe to standardize on Simplex-TIREX Twin Mining Machine Cables, Type G.

TIREX Type G cables are especially designed with an uninsulated grounding conductor to comply with the Bureau of Mines recommendations.

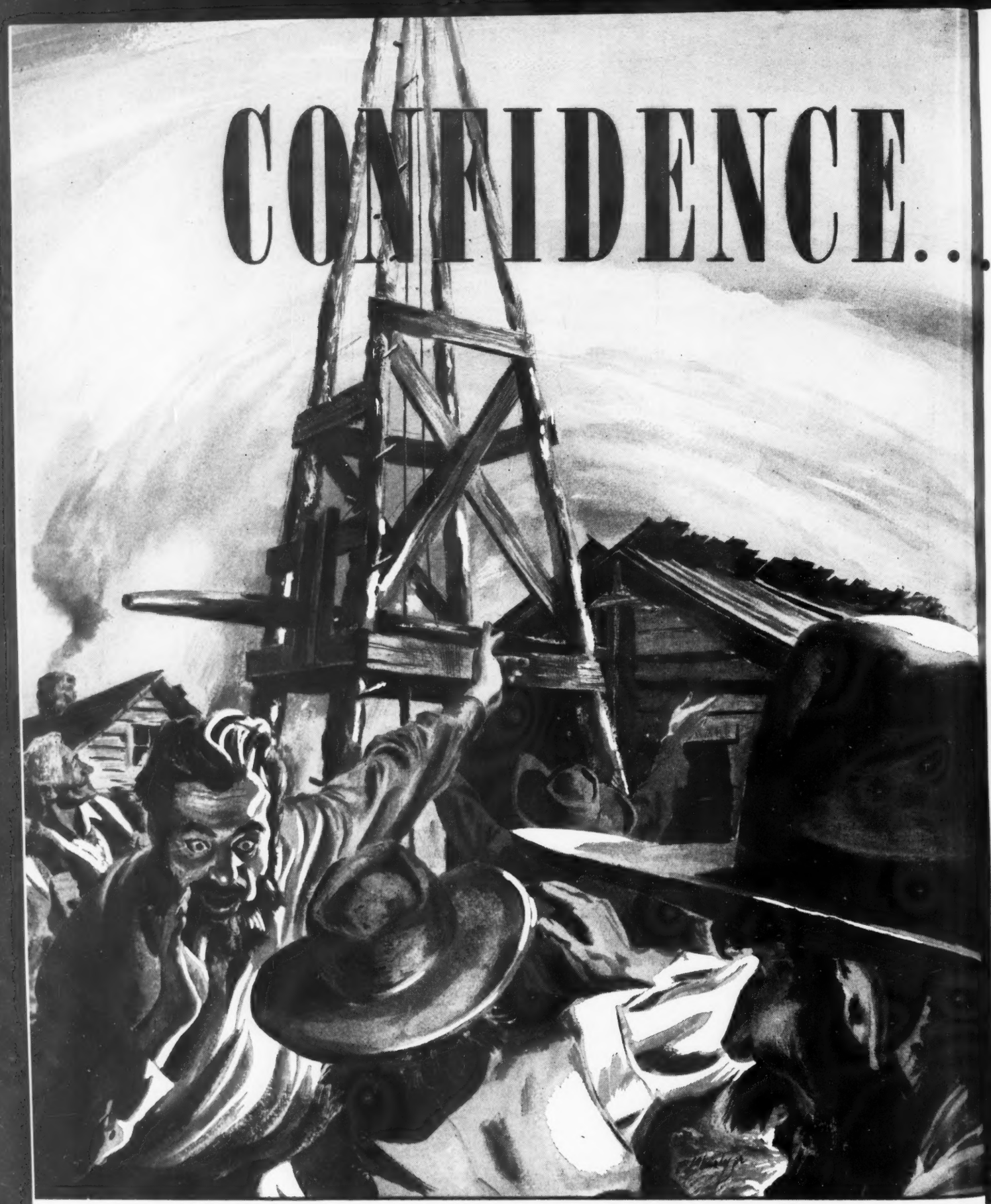
But quality, too, must be considered where safety is concerned. The cured-in-lead jacket of Selenium Neoprene on all TIREX cables effectively resists flame, and bears approval No. P-101 of the Department of Mines, State of Pennsylvania. Its resistance to moisture, oil, acids, and abrasives shields the conductors and insulation from damage and further reduces the danger of short circuits and resultant arcs.

TIREX SELENIUM Neoprene Armor

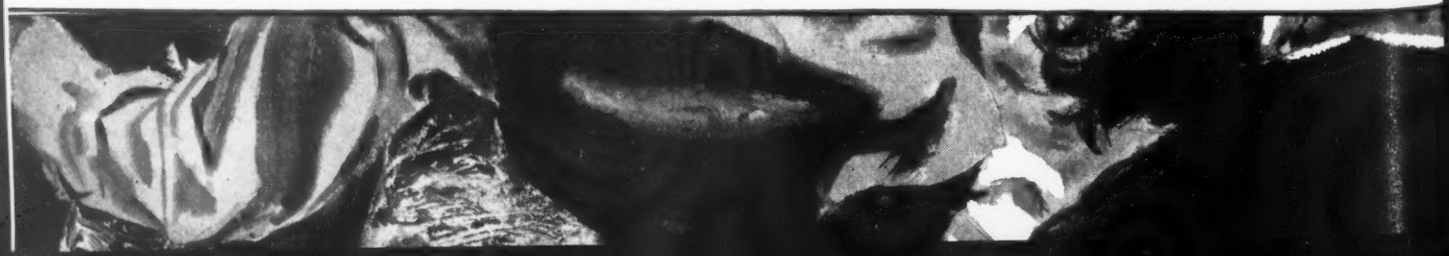
To know your equipment before you buy is "Safety First". Make a note right now to investigate Simplex-TIREX cables at your first opportunity.

Simplex-Tirex

SIMPLEX WIRE & CABLE CO., 79 SIDNEY ST., CAMBRIDGE 39, MASS.



Manufacturers of Wire Rope and Strand • Fittings • Slings • Screen, Hardware and Industrial Wire Cloth • Aerial Wire Rope Systems
Hard, Annealed or Tempered High and Low Carbon Fine and Specialty Wire, Flat Wire, Cold Rolled Strip and Cold Rolled Spring Steel • Ski Lifts



. . . . . how much is it worth?

EVEN IN THIS ATOMIC ERA, what engineer wouldn't be awed at the possibility of building a bridge of his own design across the hazardous Niagara gorge? Yet John A. Roebling was commissioned to do just that *98 years ago* . . . ten years before this country's first oil well was drilled!

What an outstanding example of confidence. The confidence of a man in his own work. The confidence of people in one man and his abilities.

Today this same confidence, that has been nurtured through the years, is still alive in the company founded by this man and his sons. On this same foundation was built a business that has always believed that confidence must be created and grows through completely honest business transactions with each and every one of its customers.

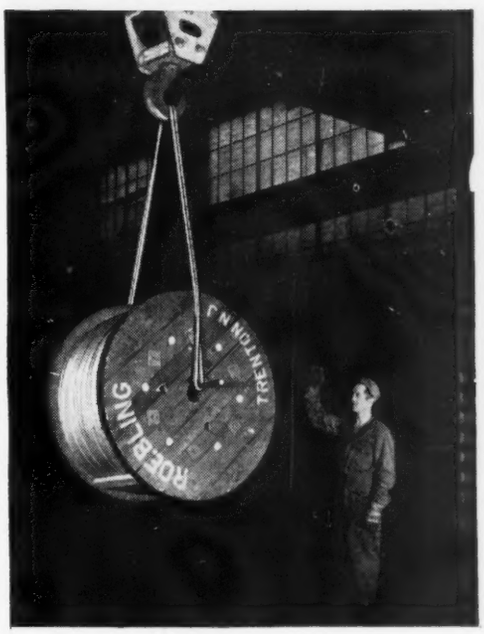
Little wonder, then, that your confidence in John A. Roebling's Sons Company is guarded so carefully.

WHY MINERS SPECIFY "BLUE CENTER" STEEL WIRE ROPE

BASICALLY, there is but *one* reason: a firm confidence in the Roebling name and reputation, in the Roebling organization and representatives, in the quality of the wire rope itself.

Of course, there are other reasons, too. You have the assurance that the complete range of constructions and sizes in "Blue Center" Steel Wire Rope includes the *right* rope for your installation. And whether it's a preformed or non-preformed type, you can trust it to give you the greatest measure of service for the money . . . day in and day out.

Let a Roebling Field Engineer advise you on unusual problems of rope selection, operation and maintenance. His knowledge is based on his own experience *plus* field studies, research and thousands of service records studied by Roebling's Engineering Department. Call him at our nearest branch office.



JOHN A. ROEBLING'S SONS COMPANY
TRENTON 2, NEW JERSEY
Branches and Warehouses in Principal Cities

Electrical Wire and Cable • Suspension Bridges and Cables
Aircord, Aircord Terminals and Air Controls • Lawn Mowers

ROEBLING

A CENTURY OF CONFIDENCE

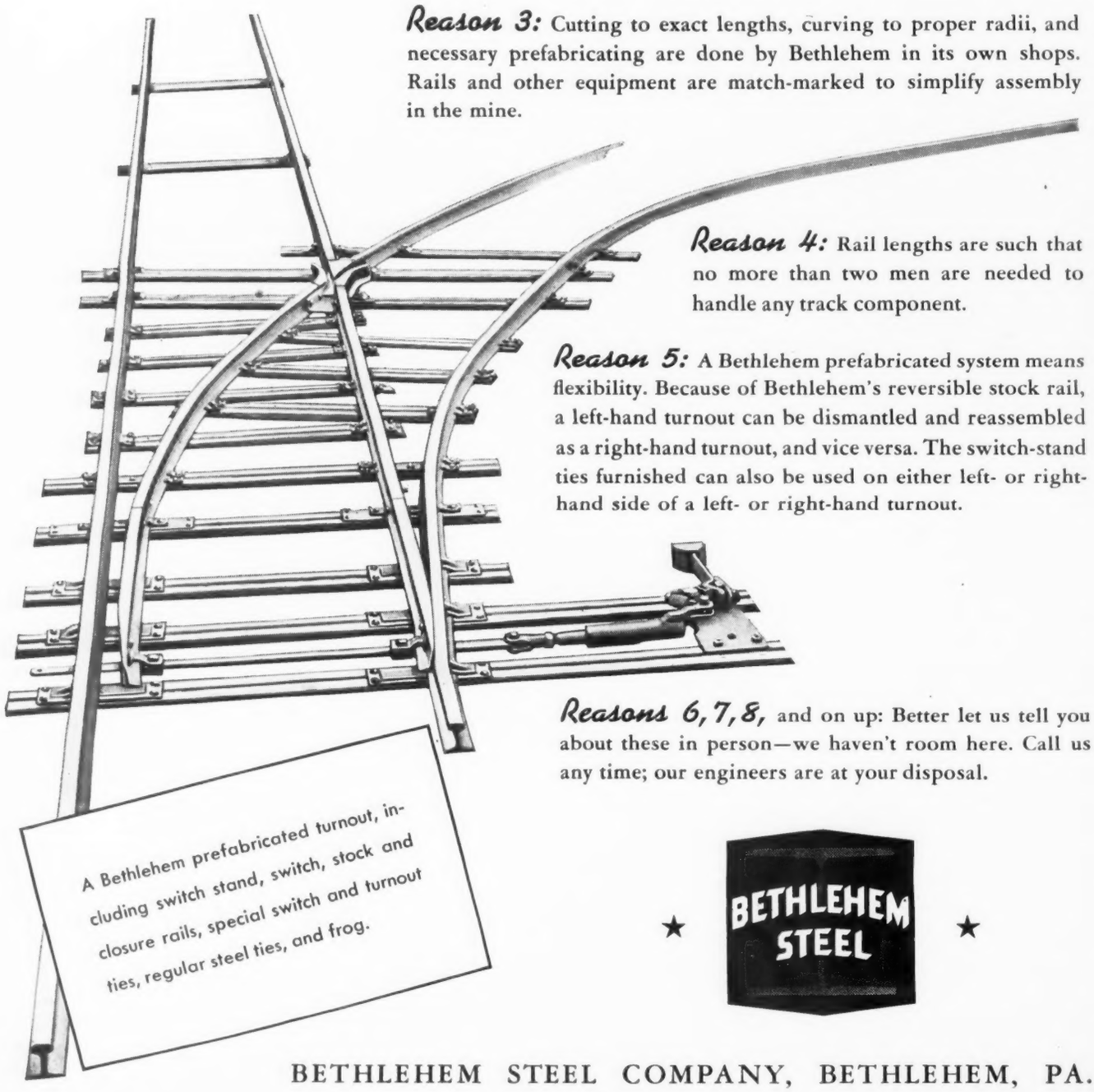
Why Bethlehem Prefabricated Track

IS EASY TO INSTALL

Reason 1: It's *planned* track. This means on-the-job study. Bethlehem engineers spend as many hours or days at your mine as this study calls for. Then they plan, in detail, an easily-assembled track system for your individual workings.

Reason 2: The number of rail lengths and curvatures is held to an absolute minimum.

Reason 3: Cutting to exact lengths, curving to proper radii, and necessary prefabricating are done by Bethlehem in its own shops. Rails and other equipment are match-marked to simplify assembly in the mine.



A Bethlehem prefabricated turnout, including switch stand, switch, stock and closure rails, special switch and turnout ties, regular steel ties, and frog.

Reason 4: Rail lengths are such that no more than two men are needed to handle any track component.

Reason 5: A Bethlehem prefabricated system means flexibility. Because of Bethlehem's reversible stock rail, a left-hand turnout can be dismantled and reassembled as a right-hand turnout, and vice versa. The switch-stand ties furnished can also be used on either left- or right-hand side of a left- or right-hand turnout.

Reasons 6, 7, 8, and on up: Better let us tell you about these in person—we haven't room here. Call us any time; our engineers are at your disposal.

★ BETHLEHEM STEEL ★

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation

SAVES PRODUCTION TIME!

JOY TIMBER SETTER

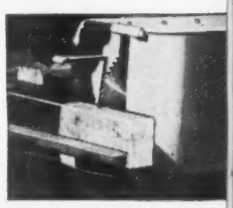
Safe...Easily Operated

LIFTS TIMBERS TO 7'8"

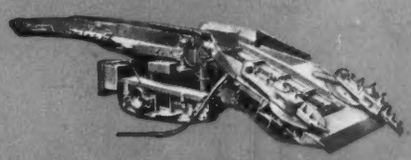
Hydraulically operated boom has swing of 50° to right or left of center. Timbers lift straight up on free, full swiveling platform for safe, accurate positioning. Second jack, which can be lowered to mine floor, provides solid prop from bottom to roof. Carries enough timbers to serve ordinary shift. Joy's new, automatic, hydraulic cable reel is standard equipment. Overall height of machine only 35".

Built-in Timber Saw is fully protected

Timbers can be cut to exact sizes at point of work. Saw is hydraulically operated, returning to protective shield immediately upon release of handle.



JOY LOADERS MOVE TONNAGE FASTER



Models for all seam heights and mining systems

WAD CL 1223

Consult a Joy Engineer

JOY DIVISION

JOY MANUFACTURING CO.

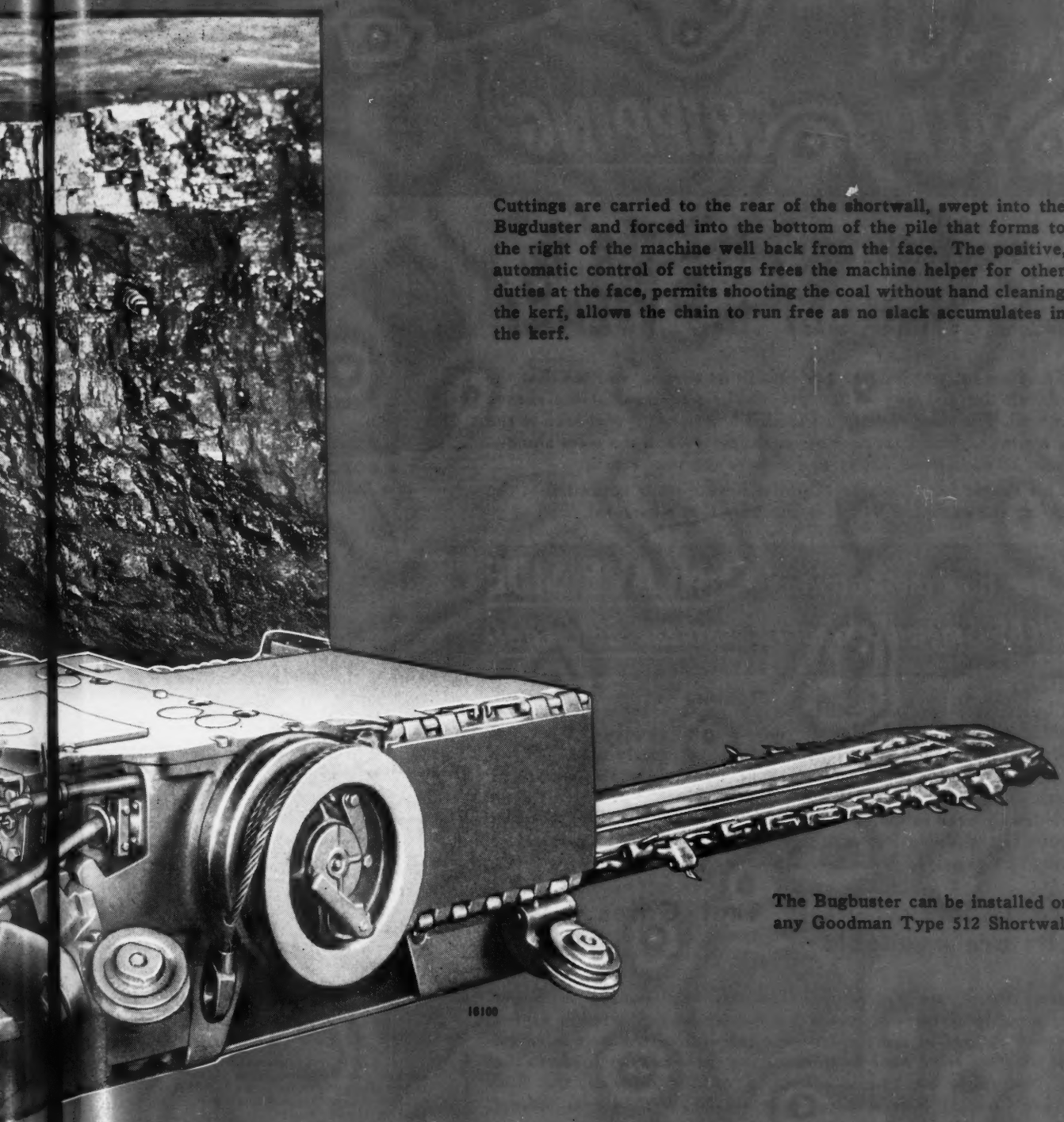
GENERAL OFFICES: HENRY W. OLIVER BLDG., PITTSBURGH, PA.

CUTTINGS DISPOSED *without* DUST, *without* HAND

16145

Cuttings are readily loaded out by the Duckbill-Shaker Conveyor

SHOVELING *with* THE GOODMAN BUGDUSTER



Cuttings are carried to the rear of the shortwall, swept into the Bugduster and forced into the bottom of the pile that forms to the right of the machine well back from the face. The positive, automatic control of cuttings frees the machine helper for other duties at the face, permits shooting the coal without hand cleaning the kerf, allows the chain to run free as no slack accumulates in the kerf.

The Bugbuster can be installed on any Goodman Type 512 Shortwall

GOODMAN MANUFACTURING COMPANY

CHICAGO 9, ILLINOIS

In Any V-Belt Only the SIDES Touch the Pulley The Sides Do ALL the GRIPPING

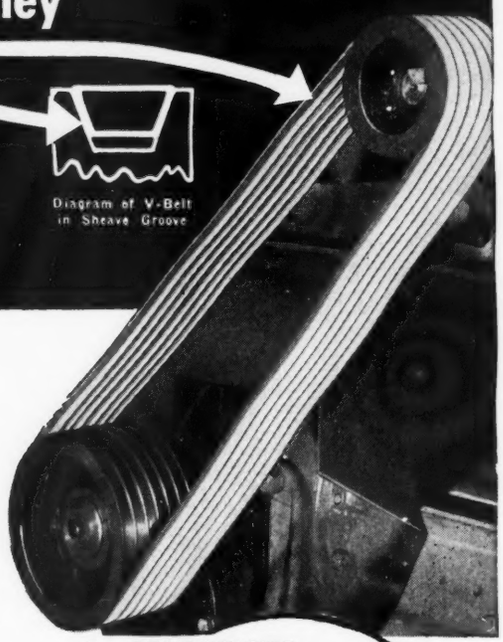


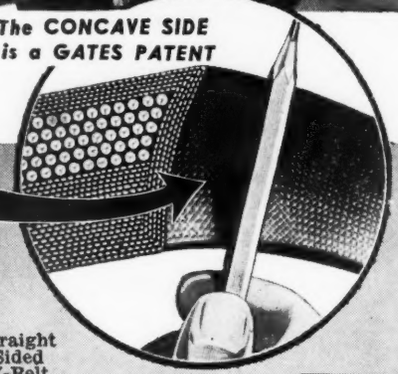
Diagram of V-Belt in Sheave Groove

— Naturally, It's the *SIDES* that GET the WEAR!

The moment you look at a V-belt in its sheave, you see that the *sides* do all the *gripping*—They get *all the wear* against the sheave groove wall. The sides *pick up* the load. They transmit that load to the belt as a whole. And then, once more, the sides—and the sides alone—take hold of the driven pulley and deliver the power to it.

This simple fact explains why you have always noticed that the *sidewall* of the *ordinary* V-Belt is the part that *wears out first.*

★Now See How the *Patented* CONCAVE SIDE *REDUCES Sidewall Wear - Lengthens Belt Life!*



The CONCAVE SIDE is a GATES PATENT

Clearly, since the sidewall is the part that wears out first, anything that prolongs the life of the sidewall will lengthen the life of the belt. The simple diagrams on the right show exactly why the ordinary, straight-sided V-Belt gets excessive wear along the *middle* of the sides. They show also why the Patented Concave Side greatly reduces sidewall wear in Gates Vulco Ropes. That is the simple reason why your Gates Vulco Ropes are giving you so much longer service than any straight-sided V-Belts can possibly give.

Straight Sided V-Belt

Fig. 1

How Straight Sided V-Belt Bulges When Bending Around Its Pulley

Fig. 1-A

You can actually feel the bulging of a straight-sided V-Belt by holding the sides between your finger and thumb and then bending the belt. Naturally, this bulging produces excessive wear along the middle of the sidewall as indicated by arrows.

Fig. 2

Gates V-Belt with Patented Concave Sidewall

Showing How Concave Side of Gates V-Belt Straightens to Make Perfect Fit in Sheave Groove When Belt Is Bending Over Pulley.

Fig. 2-A

No bulging against the sides of the sheave groove means that sidewall wear is evenly distributed over the full width of the sidewall—and that means much longer life for the belt!

★More Important NOW That Gates SUPER V-Belts are Available

Now that Gates *Specialized* Research has resulted in Super V-Belts capable of carrying much heavier loads—up to 40% *higher horsepower ratings* in some cases—the sidewall of the belt is called upon to do even *more work* in transmitting these heavier loads to the pulley. Naturally, with heavier loading on the sidewall, the life-prolonging Concave Side is more important NOW than ever before!

THE GATES RUBBER COMPANY DENVER, U. S. A.

"World's Largest Maker of V-Belts"

479

GATES VULCO ROPE DRIVES

Engineering Offices and Jobber Stocks **IN ALL INDUSTRIAL CENTERS** of the U. S. and 71 Foreign Countries

Gates

REG U.S. PAT OFF

THE MARK OF SPECIALIZED RESEARCH

MORE ENGINES . . . MORE ASSURANCE

More engines . . . because Cummins has completed a $3,000,000.00 postwar expansion program, increasing manufacturing space 44.8%.

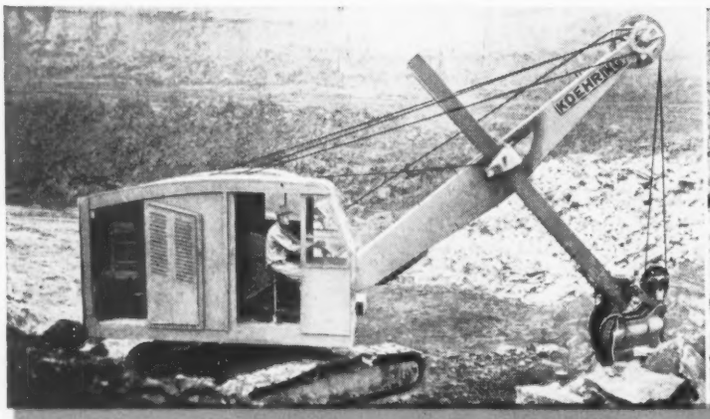
More assurance . . . because Cummins dealers have also increased floor space . . . enlarged parts stocks . . . added special tools for rebuilding engines to factory standards, thus assuring Cummins Dependable Diesel owners of continued profits on their "premium" jobs.

CUMMINS ENGINE COMPANY, INC., COLUMBUS, INDIANA

KOEHRING DUMPTOR

No body hoist trouble . . . extra yardage every shift

KOEHRING SHOVELS keep up with DUMPTOR SPEED



Koehring 304 (¾ yard) Rock Shovel: Heavy Duty leader in ¾ yard class Enclosed gears run in continuous oil bath

Koehring 605 (1½ yard) Rock Shovel: Exclusive power clutch eliminates operator fatigue Boom-foot shock absorber permits greater speed in rock.

DUMPS IN 1 SECOND

Pull the release lever and gravity instantly tips the scoop-shaped body 90 degrees. One second later, load is dumped . . . you're ready to go for another load.

You don't waste 10 seconds, 20 seconds, 60 seconds. Kick-out pan keeps body clean in any material.

Because Dumptor has no body hoist, you have no body hoist trouble. Dumps fast even in zero weather. Saves all body hoist maintenance expense.

NO TURN-TIME, MORE HAUL-TIME

You save more seconds every trip, because Dumptor never turns on shuttle hauls. Three reverse speeds are just as fast as three forward speeds. Constant mesh transmission is especially designed for shuttle work.

DRIVE AXLE STANDS UP UNDER SHOVEL LOADING: Dumptor is built by a shovel manufacturer for work with rock shovels. Drive axle is 4" chrome nickel steel, heat treated. Steel case protects entire assembly. Welded steel body is heavily reinforced. Steering axle oscillates to absorb frame twisting shocks of haul road travel.

EASIEST TO MAINTAIN

Everything accessible. One man can do complete grease job in 5 minutes. Clutch removed in fraction of time it takes to remove a conventional clutch, because engine is not moved, transmission case is not touched. Every gear in transmission is removable through one cover.

YOU'LL NEED FEWER UNITS — IF THEY'RE DUMPTORS

Job studies prove 3 6-yard Dumptors can easily handle shovel output formerly requiring 4 other 6-yard hauling units. Generally, there is a saving of 20 to 25 per cent in number of units on jobs within Dumptor range of haul.

Experienced Dumptor engineers are ready to survey your off-the-highway haul problems. Contact your Koehring Distributor today.

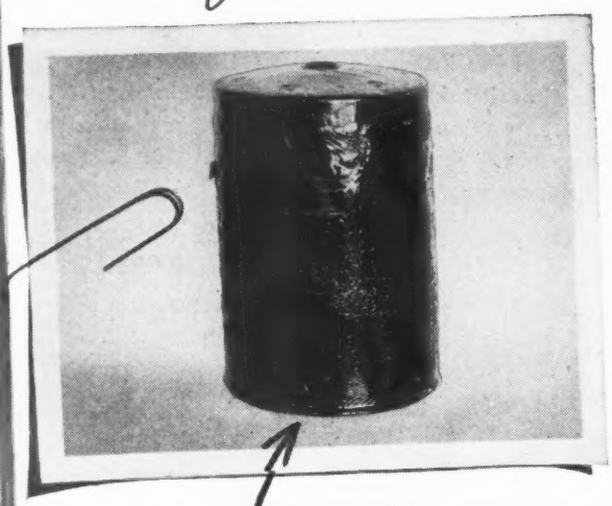
KOEHRING HEAVY DUTY

NO BODY HOIST TROUBLE
because Dumptor has no body hoist. Gravity tips body instantly, returns it automatically when empty.

KOEHRING COMPANY, Milwaukee 10, Wisconsin
Subsidiaries: JOHNSON • KWIK-MIX • PARSONS

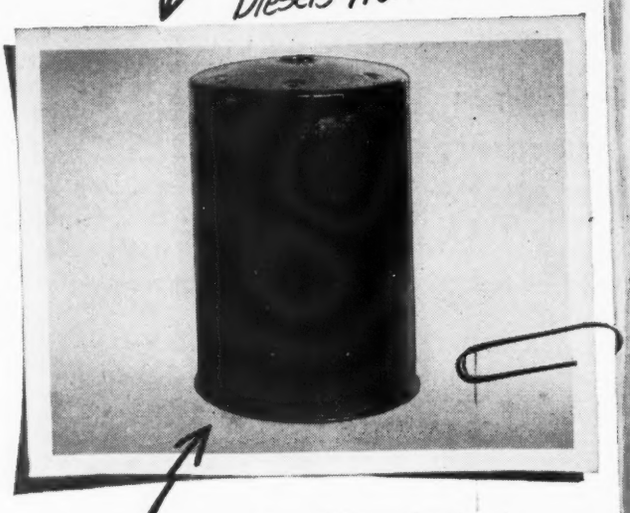
LUBE MEMO

How Joe stopped Filter Clogging



Joe says filters have gummed up like this after about 600 hours on oil he's been using

Joe says nothing but RPM Delo Oil in his Diesels from now on



Here's how the filter looked after 600 hours on RPM Delo Diesel Engine Lubricating Oil. Joe finds RPM Delo Oil keeps filters clean because:

1. It's compounded to resist oxidation and minimize sludge.
2. Its "detergent" cuts down sludge.
3. It remains stable in the presence of moisture.

DIESEL ENGINE RPM DELO LUBRICATING OIL

Set up trial Today!

DISTRIBUTED BY

Gordon Lubricating Company

In Pennsylvania, Ohio, West Virginia, Kentucky
1023 Oliver Bldg., Pittsburgh, Pa. At. 5172
Andover Road, Columbus, Ohio
Kingswood 1495

DISTRIBUTED BY

Transcentral Oil Corporation

In Indiana, Illinois, Missouri, Michigan
600 S. Michigan Ave., Chicago, Ill.
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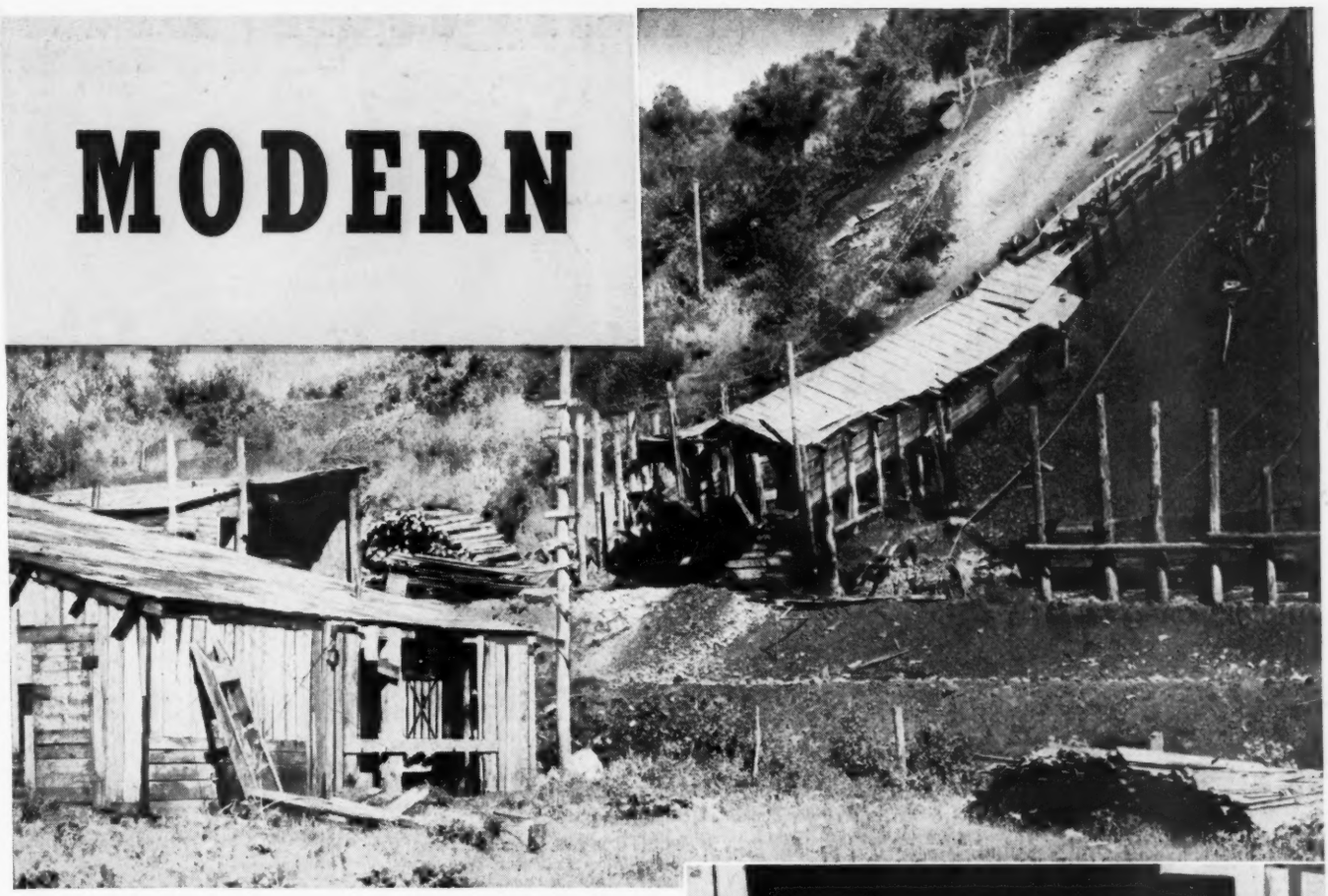
MODERN



. . . where it counts

Miles from "nowhere" and no high-line in sight! But a rugged, up-to-date "Caterpillar" Diesel D13000 Engine solves the problem — easily; makes the vital part of this mine's operation highly efficient and modern. It drives a 75-kw. generator to supply all the electricity needed for lights, drills, fans and pumps for the Boscia Coal Company's operations near Oak Creek, Colorado. It works at 8000 ft. altitude in extremes of temperature, and, according to the owners' statement, is exceeding all expectations.

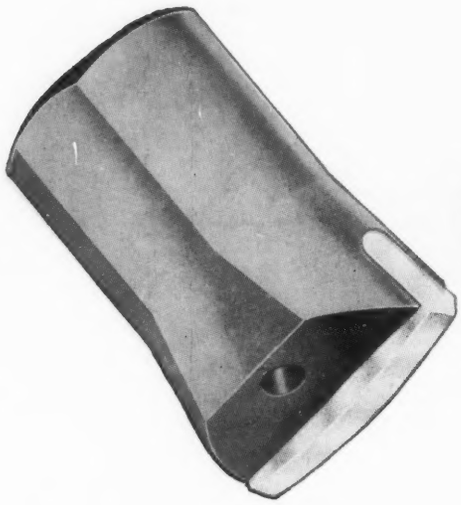
And there's more good news ahead: As the years go by, rolling up thousands of hours of dependable performance with but little fuel and maintenance costs, the engine's lifetime service will show a wealth of profit in savings over other types of power. It's that way with countless "Caterpillar" Diesels the world over.

CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS

CATERPILLAR
REG. U. S. PAT. OFF.
DIESEL
ENGINES • TRACTORS
MOTOR GRADERS
EARTHMOVING EQUIPMENT

A formula that will bring y

Plus



Plus

Kennametal Cutting Machine Bits

Here's how you can move a preparation job faster, more economically.

Kennametal cutting machine bits are your best performers in coal, sulfur, rock, etc., in the top cut, shear, or in the bottom. Their hard wear-resistant cutting edges enable them to last longer, take hard shock, and reduce bit cost per ton.

Mining machines can operate easier, at less load, more uniform power consumption, and there's less maintenance on chains and machines. Cuttings are larger, advance rates faster.

With Kennametal cutting machine bits the miner spends less time changing or resetting. His time is utilized for production, not wasted in costly shut-downs, hauling, handling, and sharpening.

For complete details write for catalog M-4 today.

Kennametal Percussion Bits

Kennametal percussion bits drill hard rock at phenomenal speeds, far faster than any other metal ever used in percussion drilling. Hole after hole can be drilled full depth with the same bit. There is little gage loss even after a hundred or more feet has been drilled in such hard rock as hard silica sand, hard limestone, etc. The fact that holes do not taper assures maximum contact of charge, better detonation, and minimizes the amount of rock dust.

In many instances one Kennametal bit has lasted longer than 200 to 300 ordinary detachable bits. The number of bits required to do a day's work is reduced to a mere handful . . . while with ordinary bits special trips are necessary to haul bits back to where top, bottom, or rib work is being done. Jack hammers usually operate at lower air pressures and in all cases consume less air due to the shorter length of time the drill operates.

The bits drill at from two to nine times as fast as steel to reduce the number of man hours for percussion drilling . . . the labor cost is lower, the bits last longer, and cost less to use.

For more complete details write for catalog M-4 today.

Send for a copy of the NEW Kennametal Mining Tool Catalog Today!

NEW!

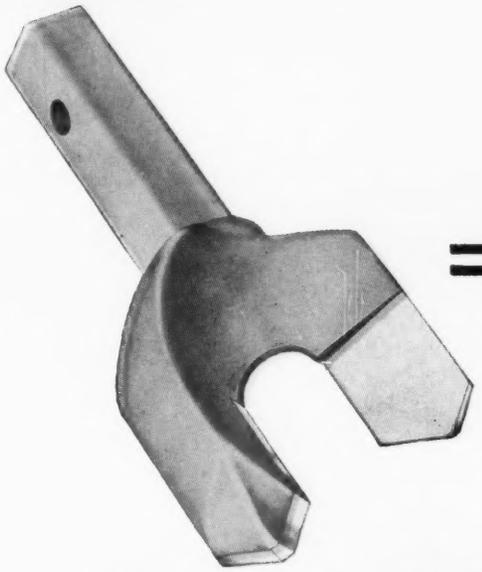
The new Kennametal Mining Catalog M-4 provides you with a wealth of helpful information on cutting, drilling, augers, sockets, prices, and recommendations for auger and bit sizes to be used together.

Get your request in the mail today, we'll be glad to send you our new, complete catalog . . . a new edition that may mean more profits in the mine you operate or supervise.

In the race for coal mining economy, modernization . . . Kennametal cutting machine bits come near the top bracket as a starting point for increasing efficiency, improving work at the face . . . right where high production originates.

8 Sizes and Styles for all popular chains

you higher profits . . .



=Lower Mining Costs

Kennametal Drill Bits

Kennametal drill bits for post, mounted or push drills help you step up production at the face, balance operations. Their hard Kennametal cutting edges have a high compressive strength that enables the bit to take the hard jolts of high speed drilling in coal, rock, slate, clay, etc. Kennametal has the inherent characteristic to resist wear and abrasion . . . to stay sharp longer under constant use, and it allows the drill to operate free, without binding, sticking, or slowing down at high drilling speeds.

The bits greatly reduce the burden on the drill by eliminating the usual load near the end of the hole that is caused by dull bits. In post or mounted drilling, the number of armature burnouts are less and the maintenance cost is lower. In push drilling specially designed cutting edges take hold quickly, feed properly, and relieve much of the burden of manual drilling.

Kennametal bits retain their gage far longer than hard surfaced steel, and they assure better, more effective detonation by providing a straight, uniform hole. The bit cost is lower, less time is required for drilling blast holes, and fewer bits need to be sharpened, and transported.

For complete details write for catalog M-4.

KENNAMETAL

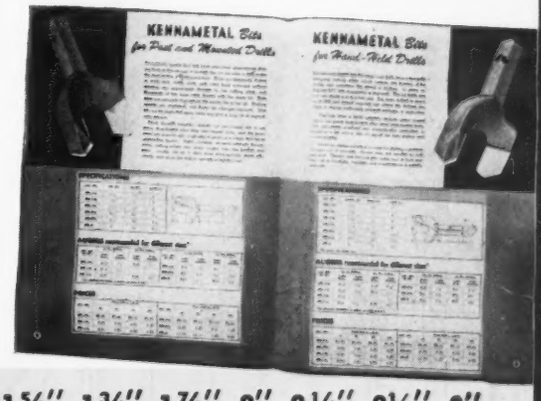
MINING DIVISION

KENNAMETAL Inc.
3 Lloyd Avenue
Latrobe, Pa.

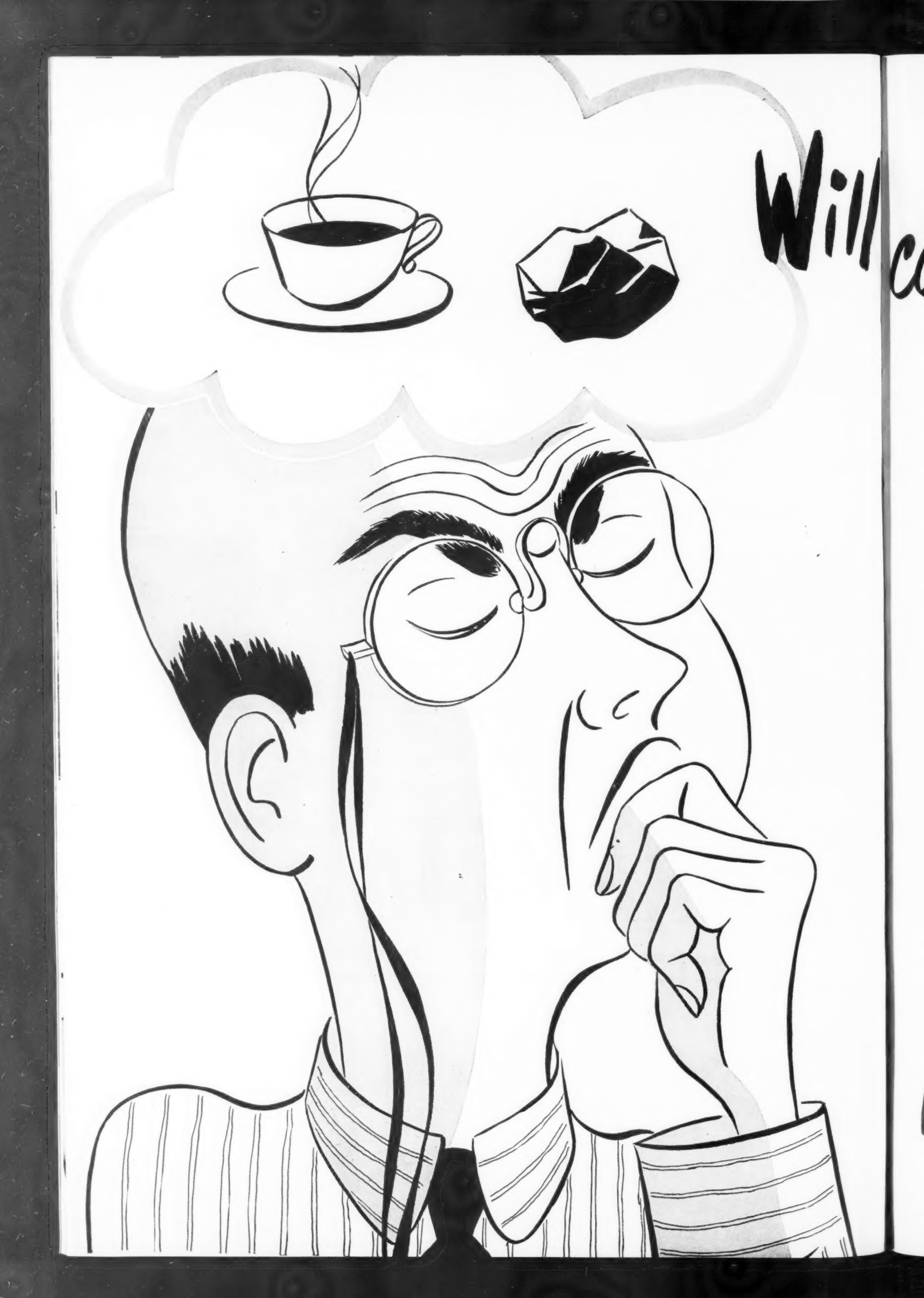
Send for a copy of the NEW Kennametal Mining Tool Catalog Today!

In sizes of 1⅜", 1½", 1⅝", 1¾"

Drill bits and percussion bits go hand in hand with faster, more economical work in the section. Drill bits bring you faster blast hole work . . . complement fast cutting. The percussion bit speeds the way in rock work in the section, entry, or overcast.



In sizes of 1⅝", 1¾", 1⅞", 2", 2¼", 2½", 3"


Will

Will coffee replace coal in industry?

Ridiculous? Of course it's ridiculous.

But down in Brazil huge quantities of coffee have been burned in industrial and power plant furnaces.

That was a special situation, just as are other situations in which fuels such as bagasse, or sawdust, are used.

Even Sewage Can Be Fuel

In sewage disposal plants at Chicago and elsewhere, dried sludge, and methane gas from digestion tanks, are burned for power and processing. Those are special cases, too.

The point is that no fuel can now seriously compete with coal in industry, except for special, limited purposes, or in special circumstances.

No Complacency

This does not alter the fact that the coal industry should not be, and is not, complacent about its position in the industrial field. Coal, like everything else used in industry, is the subject of continuous appraisal in the light of technological progress.

Through its research organization the coal industry, therefore, seeks to fortify further its natural advantages as industrial fuel by developing better and better coal-burning equipment.

C&O's Three-Fold Contribution

The Chesapeake & Ohio Railway contributes three-fold to the strength of coal in the industrial fuel market: (1) By helping to finance these researches. (2) By employing its own combustion engineers to aid industry in using coal to best advantage. (3) By performing efficiently its primary job of getting the coal promptly from mines to distributors and to their industrial customers throughout the important territory it serves.

Chesapeake & Ohio Railway

Keep the industrial plants burning coal

TOURNADOZER

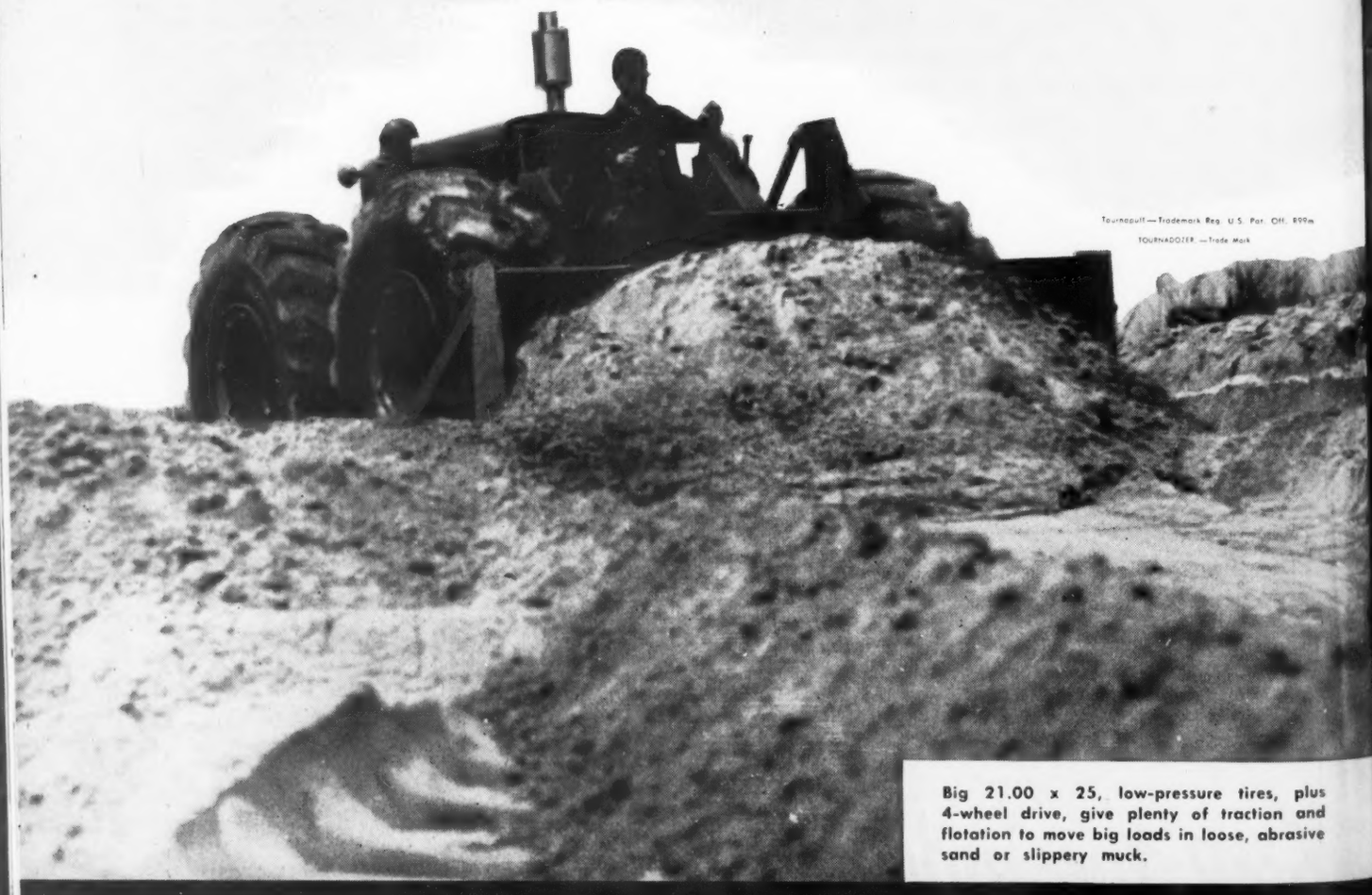
New high-speed, rubber-tired tool to increase mine production

THE NEW rubber-tired Tournadozer gives you the high-rolling speed you have always wanted for dozer work in and around your mines.

You get 15 m.p.h. top speed . . . and you get it in BOTH FORWARD and REVERSE.

Equally important is the constant-mesh transmission which gives you instantaneous selection of 4 forward and 4 reverse speeds. Just move the selector lever to the speed you want and air-actuated clutches give it to you right now. This means an extremely fast, maneuverable unit . . . quick to get in there and get going without any loss of momentum . . . and you get high-speed reverse that cuts "deadhead" time to a fraction of that required by track-type tractors.

180 h.p. Model C Tournadozers are now in production . . . see your LeTourneau Distributor for delivery dates . . . order NOW.



Tournapull—Trademark Reg. U.S. Pat. Off. 899m
TOURNADOZER.—Trade Mark

Big 21.00 x 25, low-pressure tires, plus 4-wheel drive, give plenty of traction and flotation to move big loads in loose, abrasive sand or slippery muck.

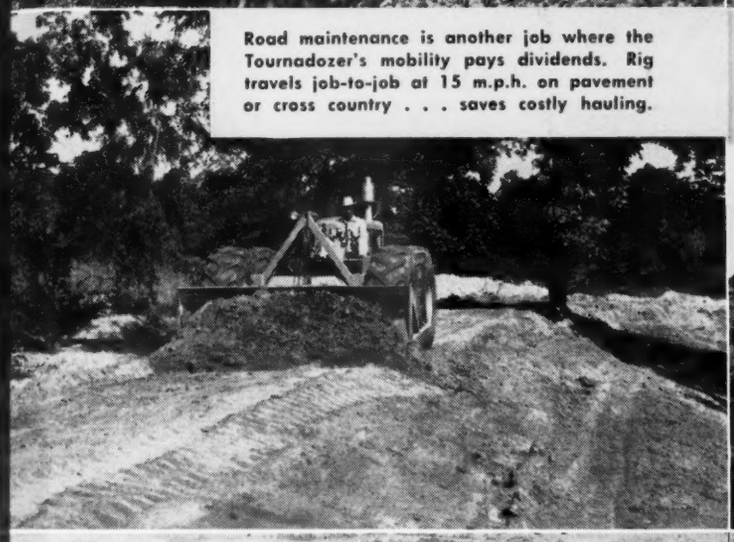
LETOURNEAU LET EQUIPMENT

See your Le Tourneau Distributor NOW for complete information

get faster operation with greater safety, through improved operator vision . . . sure footed traction . . . high reverse speeds.

dozer gets around quicker, easier because of powerful 4-wheel drive . . . short-coupled wheelbase . . . air-actuated controls.

Road maintenance is another job where the Tournadozer's mobility pays dividends. Rig travels job-to-job at 15 m.p.h. on pavement or cross country . . . saves costly hauling.



In removing overburden, Tournadozer's big bowl capacity . . . high forward and reverse speeds . . . non-stop speed selection . . . all help you strip more yards per hour.

As a pusher, the Tournadozer's low center of gravity, husky 180 h.p. Diesel engine and high-speed maneuverability mean faster loading . . . more Tournapulls served per pusher

LETOURNEAU
PEORIA, ILLINOIS

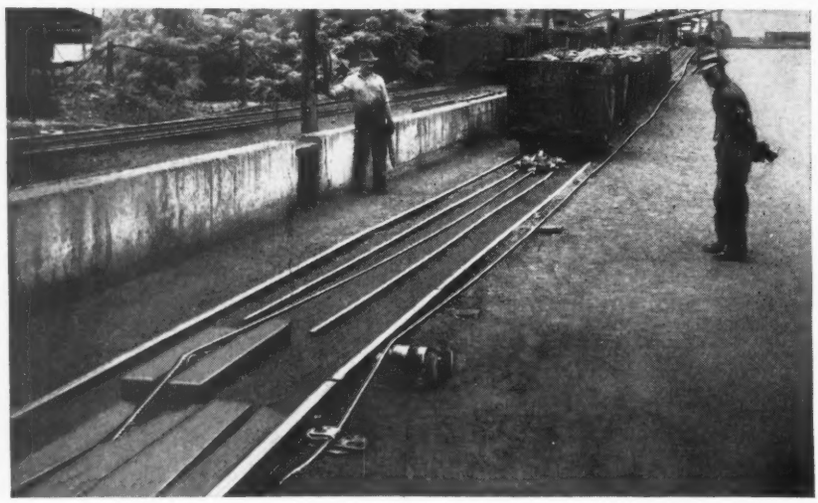
HIGH-SPEED RUBBER-TIRED

TOURNADOZERS

Bethlehem Shaft Ropes are GOOD ropes...

They are carefully engineered for this particular job—carefully built to withstand the stresses set up by acceleration. They are strong, tough, rugged. When Bethlehem recommends a shaft rope, it is only after loads, speeds, and depth of shaft have been thoroughly studied with respect to their influence on wire-rope performance.

Bethlehem Haulage Ropes are GOOD ropes...



In this type of line, abrasion-resistance is an important factor. Bethlehem will see that you get the correct lay and the proper-sized crown wires for longest wear. Remember, haulage ropes take a tough beating from stones, ties, rollers. Bethlehem's attention to details means longer-lasting rope in this exacting service.

ALL Bethlehem Mining Ropes are GOOD ropes

Yes, if they carry the Bethlehem name, they're trustworthy ropes. Mucking lines, ropes for slopes and planes, machine-feed ropes . . . no matter what, if you get 'em from Bethlehem, they're right. We suggest you check with our field engineers for detailed recommendations.

Bethlehem Steel Company, Bethlehem, Pa.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation

When you think WIRE ROPE . . . think BETHLEHEM

BWH
DEPENDABLE RUGGEDNESS
Tough abrasion-resisting rubber covers and edges
Anti-mildew treated heavy duck (usually 42 oz.)

HOW TO "MOTHER" HEAVY COAL LOADS!

Another top performance by a BWH product

Working far underground, various room conveyor belts dump coal on this "mother belt", which brings the heavy load up to the cars.

Right-angle feed, tandem drive and huge, out-of-balance loads make the job extra tough. And it's complicated more by constant worry about breakdowns if mildew attacks the belt.

BWH engineers have specified mildew-inhibited Colliery King Belts for all such jobs. Performance has been outstanding.

Treated by a special anti-mildew process developed by BWH technicians, Colliery King Belts have piled up high tonnage records even under dark, damp conditions usually conducive to the growth of mildew spore.

Another important factor in the long life of Colliery King Belts is the exclusive BWH process of continuous vulcanization. Called ROTOCURE, this method insures belts free from all potential "trouble spots" caused by overlaps in flat press curing. As a result, these rugged belts stand up year after year, under the most grueling demands.

Conveyor Belts are just one of many quality products manufactured by BWH. When you need industrial rubber goods, look to BWH for dependable ruggedness — to BWH distributors for dependable service.

HAVE YOU A JOB WHERE STAMINA COUNTS?

Bring us your toughest problems . . . we're specialists in solving them. Consult your nearby BWH distributor, or write to us direct.

Another Quality Product of

BOSTON WOVEN HOSE & RUBBER COMPANY

Distributors in all principal cities

PLANT: CAMBRIDGE, MASS., U.S.A. • P. O. BOX 1071, BOSTON 3, MASS.

"Users' Choice" of Piping Equipment ...in the Complete CRANE Line

Whatever you need in piping ... valves, fittings, pipe, shop-fabricated units, or pipe line accessories ... most likely Crane supplies it. Keep that in mind for a fast start and a good finish on every installation ... new or replacement. And for good dependable quality always.

There's a Crane Branch or Wholesaler nearby to give you quick, modern service. One order covers everything you need. From start to finish, every piping job is simplified when you standardize on Crane equipment, because you get this 3-way advantage:

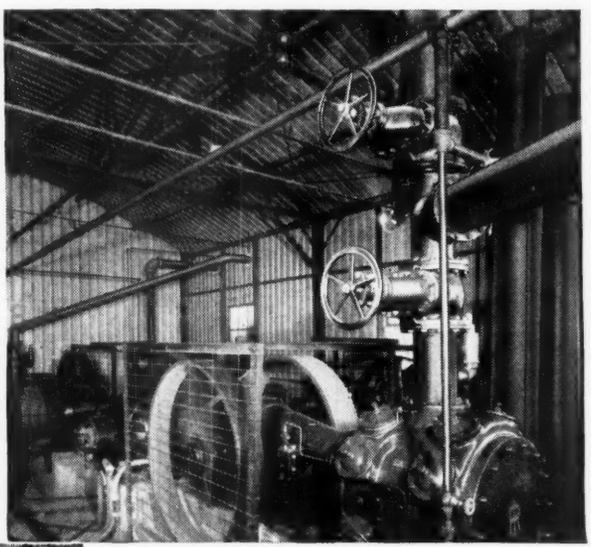
ONE SOURCE OF SUPPLY offering the world's largest selection of steel, iron, brass, and alloy piping materials for all power, process, and general service applications.

ONE RESPONSIBILITY for piping materials—helping you to get the best installation, and to avoid needless delays on the job.

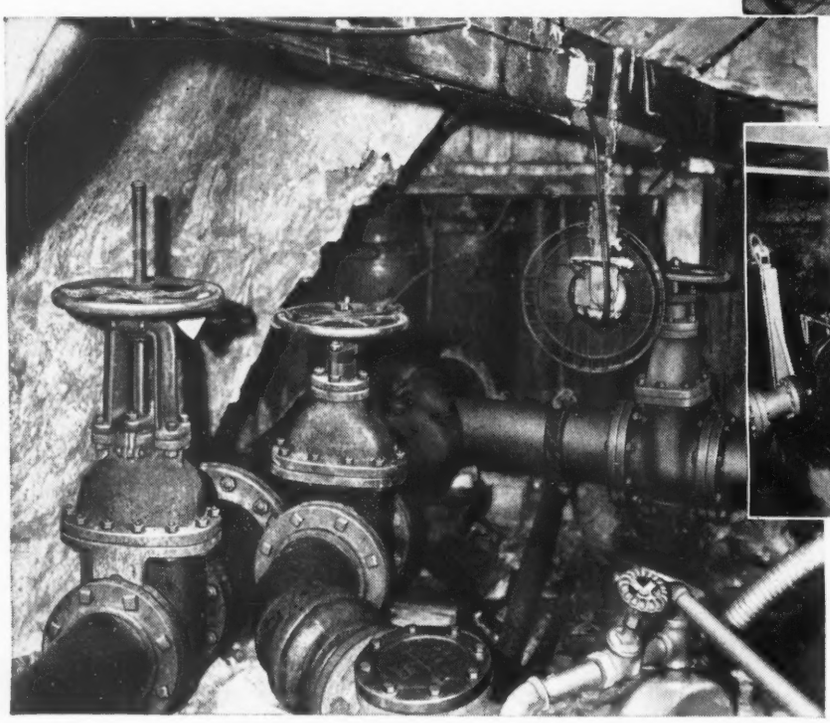
OUTSTANDING QUALITY in every item—assuring uniform dependability and durability throughout piping systems.

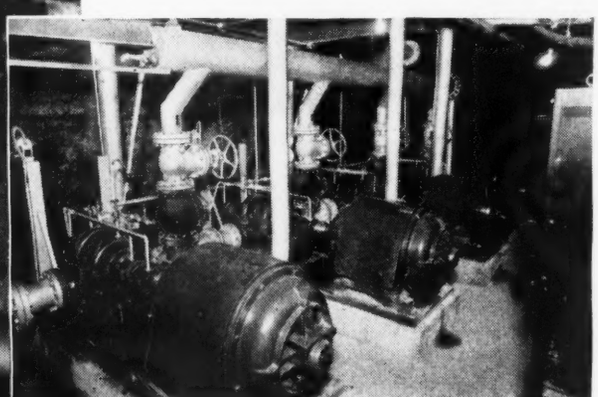
CRANE CO., 836 So. Michigan Ave., Chicago 5, Ill.
Branches and Wholesalers Serving All Mining Areas

ONE
SOURCE OF SUPPLY
RESPONSIBILITY
STANDARD OF QUALITY



FOR AIR COMPRESSOR SYSTEMS, *Crane supplies everything in piping . . . from the largest valve to the smallest fitting.*





PUMP ROOM *in a lead and fluor spar mine. Piping maintenance is simplified by getting everything from Crane . . . valves, fittings, and pipe.*

DRAINAGE LINES *in a metal mine at 1900-ft. level. For dependable control . . . for proper selection for every need . . . this mine standardizes on Crane valves and fittings.*

EVERYTHING FROM . . .

VALVES
FITTINGS
PIPE

CRANE

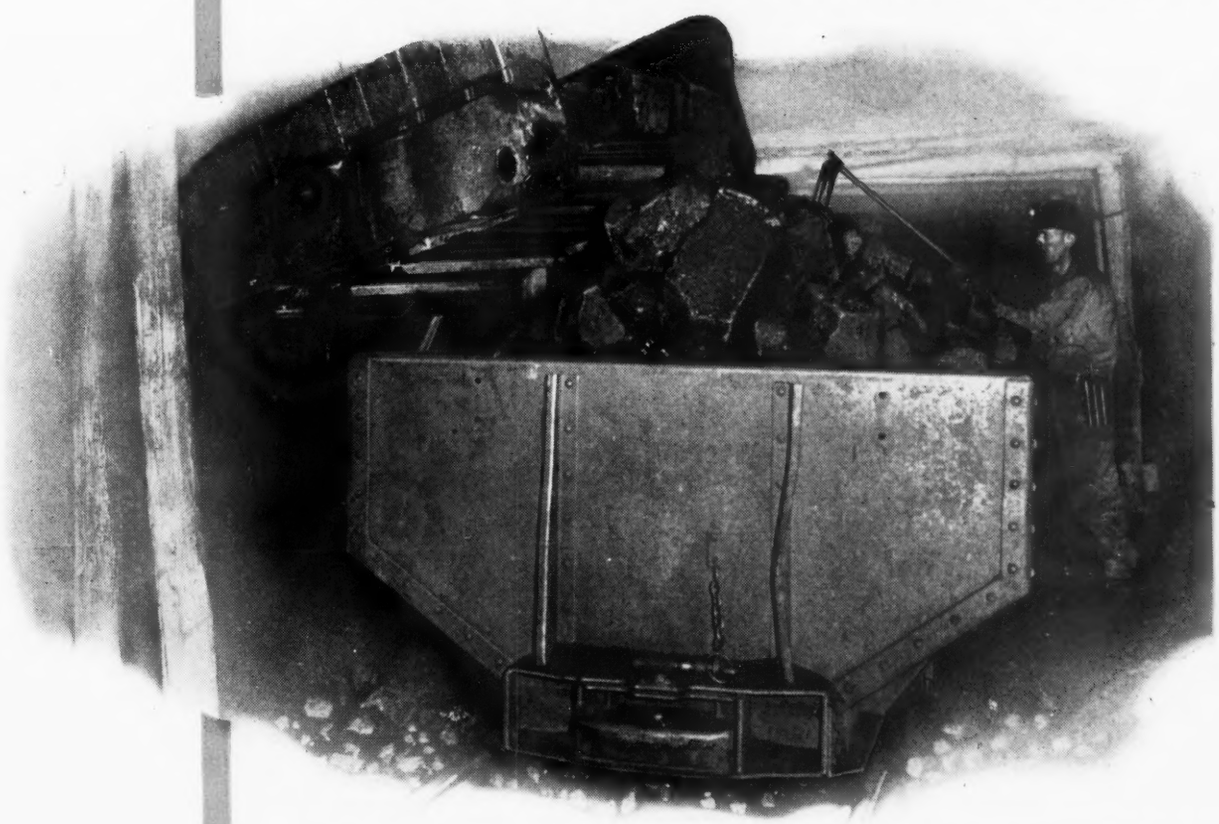
PLUMBING
AND
HEATING

FOR EVERY PIPING SYSTEM

acf

DROP-BOTTOM CARS

KEEP THE LOADERS BUSY!



One of the most important jobs in mechanical mining is "keeping the loaders busy". Tons of coal can be loaded in a matter of minutes with modern loading equipment. A steady stream of "empties" is needed if loading machine efficiency is to be kept at a high level.

ACF Drop-Bottom Mine Cars are ideal for hauling mechanically-loaded coal. The savings in dumping time permits the empty cars to be returned to the loading point quickly—to increase loader production—to lower costs!

Ask our Sales Representatives about changing-over your mine to ACF Drop-Bottom Cars—to speed up loading efficiency and reduce your costs per ton!

MINE CARS

American Car and Foundry Co.

NEW YORK • CHICAGO • ST. LOUIS
CLEVELAND • PHILADELPHIA
HUNTINGTON, W. VA. • BERWICK,
PA. • PITTSBURGH • WASHINGTON
SAN FRANCISCO.

Thor "200" STOPER—

the SMALLEST . . . the LIGHTEST Stoper Rock Drill Ever Developed!

- **Weight—Only 75 Pounds**
- **Length—Only 55-½ inches**
- **Packs the Power of Heavy Stopers**
- **Easy to Carry**
- **Easy to Lift**
- **Easy to Maneuver at All Angles**
- **Designed for Easy Handling By Miners of Small Stature**

Here it is—the machine that eliminates drudgery from stoping . . . the machine that will increase the usage of stopers and double the operator's daily drilling footage—the completely new Thor "200".

In production now for immediate delivery to mines and construction projects, the Thor "200" has already been tested and approved on every type of operation . . . *and by the smallest operators on the mine crew!*

Before you consider any stoper try the Thor "200" first—a demonstration will convince you. Mail the coupon on the opposite page today!

INDEPENDENT PNEUMATIC TOOL COMPANY

600 W. Jackson Boulevard, Chicago 6, Illinois

Export Division: 330 West 42nd St., New York 18, New York

Birmingham · Boston · Buffalo · Cincinnati · Cleveland · Denver · Detroit · Houston
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Thor **PORTABLE POWER TOOLS**

PNEUMATIC TOOLS • UNIVERSAL AND HIGH FREQUENCY TOOLS • MINING AND CONTRACTORS TOOLS

COMPLETELY NEW

MAIL THIS COUPON TODAY

We would like to arrange for an immediate demonstration of the new Thor "200" Stoper.

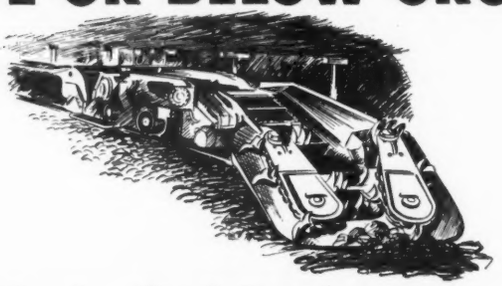
Name_____

Mine_____

Address_____

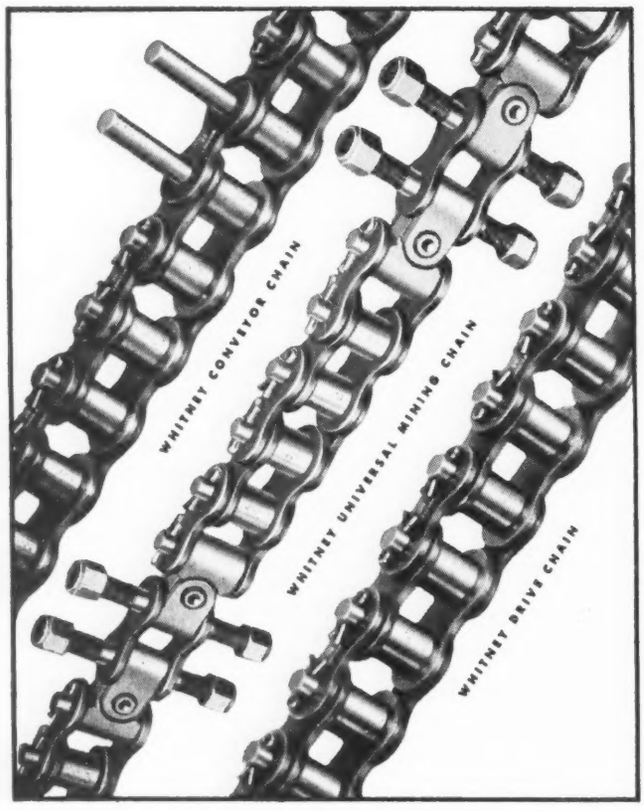
City_____ State_____

ABOVE OR BELOW GROUND



WHITNEY CHAIN DRIVES

are tonnage producers



Whitney chain . . . loader, conveyor or drive . . . is one investment that will pay out daily profits.

Made of selected heat-treated alloy steel, these tough, rugged chains keep equipment producing on schedule. They stand up under the severest of operating conditions . . . resisting shock loads without breakage. Whitney Chain Drives help give you lowest cost-per-ton production wherever they are used . . . in the preparation plant or up-at-the-face.

Accurately designed Whitney Cut Tooth Sprockets complete the combination for overall drive efficiency. Like Whitney Chains they are made to insure smooth operation and give long wearing life.

Standardize on Whitney Chains and Cut Tooth Sprockets . . . the all-steel drives . . . and you'll get greater output and less down time.

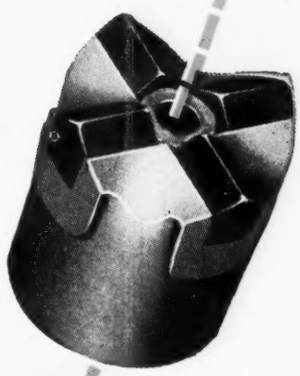
THE WHITNEY CHAIN & MFG. COMPANY

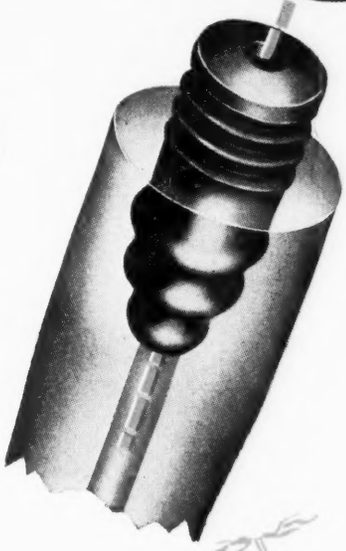
Your Assurance of Proven Power, Transmission and Conveying Since 1896

HARTFORD 2, CONNECTICUT

They're Ready

REVOLUTIONARY CARSET JACKBITS





You have been hearing about the new Ingersoll-Rand CARSET bit with *CARBOLOY* cutting edges. Here it is—an alloy steel bit with cutting edges of tungsten carbide, the hardest metallic substance made by man. Although developed with heavy drifters and high air pressures, the Carset Jackbit is in keeping with, and ideally suited to, the modern trend toward smaller machines and smaller holes. The amazing performance of this new *ultra-hard tipped* bit is due in part to its use with the recently announced "Jackstud" bit connector. Reports from mines and tests in our development work indicate the Carset bit to be one of the greatest advances in rock drilling history. We are confident that the Carset Jackbit opens the door to a new era in rock drilling. Performance and specific advances read like a driller's dream.

FOR INSTANCE, YOU CAN—

Drill continuously with one size bit
Use steels as long as the setup will permit
Increase drilling speeds 20% and higher
Almost eliminate the changing of bits
Drill small, uniform diameter holes
Materially reduce explosive costs
Drill the hardest rock
Reduce or even eliminate bit reconditioning
Use lighter drills
Drill more holes with the same amount of air
Finish more rounds per month

Order some Carset Jackbits and Stud Jackrods now and determine the economics of their use in your own operation.

CARSET JACKBIT after drilling 307 FEET

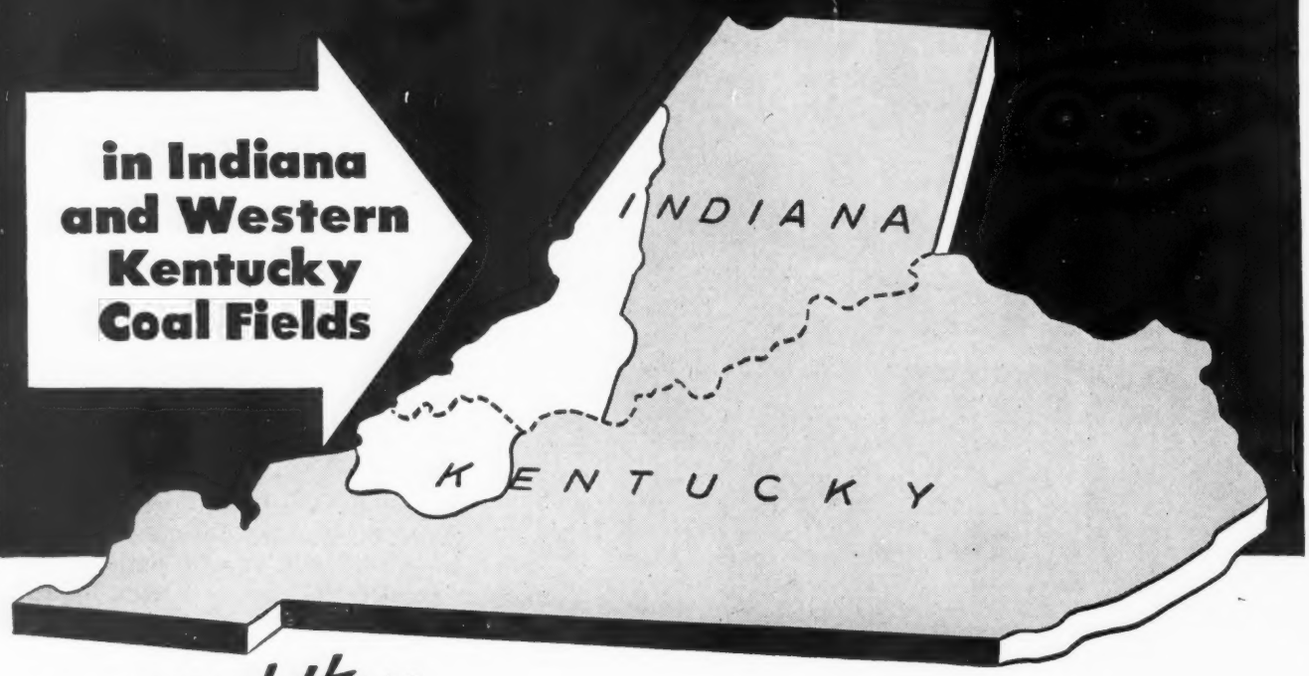
in Barre Granite with a DA-35 Drifter at 90 psi

Ingersoll-Rand

36-15 11 BROADWAY, NEW YORK 4, N. Y.

41% of Solids Pumps to "A-C"

in Indiana and Western Kentucky Coal Fields

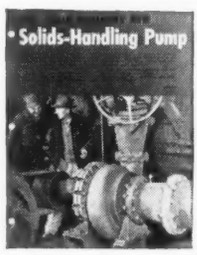


-and 36% of these Replaced other makes!

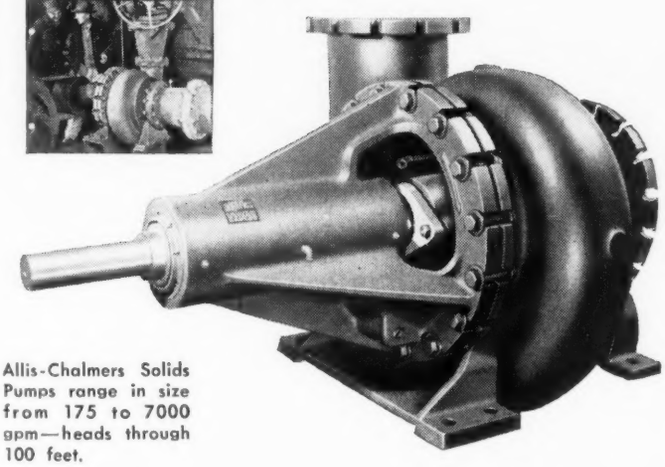
YES, 2 OF EVERY 5 sludge or fine coal handling pumps in this important coal area are Allis-Chalmers Solids Pumps. They're designed to give you *all eight* of these features or benefits:

1. **Longer pump life**—Their special design and abrasion resistant alloy construction have given pump life up to four times that of comparable pumps.
2. **All parts are easily accessible** — Downtime is cut drastically.
3. **Five principal parts**—That means fewer parts to wear out, lower inventory.
4. **Parts inventory reduced** — Parts are interchangeable within different size pumps.
5. **Easy servicing** — It is easy to service stuffing box and adjust wearing clearances.
6. **Removable element** — Entire rotating element removable without disturbing piping.
7. **Easy to regulate** — You can regulate pumping capacities quickly up or down without touching pump or pump parts, by simply changing Texrope V-belt drive ratio or drive and motor.
8. **Simple piping arrangements**—Modification to any of seven discharge positions 45° apart may be easily made in the field.

Your nearby Allis-Chalmers office or dealer will be glad to give you the whole story on these pumps. Or you can write ALLIS-CHALMERS, MILWAUKEE 1, WIS.



Call your nearby "A-C" dealer or office for Bulletin 08B6381A for additional Solids Pump information. A-2272



Allis-Chalmers Solids Pumps range in size from 175 to 7000 gpm—heads through 100 feet.

ALLIS·CHALMERS

One of the Big 3 in Electric Power Equipment — Biggest of All in Range of Industrial Products

1847 1947
A CENTURY OF SERVICE to Industry THAT MADE America Great

Cost-cutting champions!

INTERNATIONAL DIESEL CRAWLERS

That's an International TD-14 Diesel Crawler in the scene above. It's preparing a walkway for a dragline—and doing a good job at lowest possible cost for the work accomplished.

In the smaller scene an International TD-18 Diesel is leveling a spoil bank on a 10,000,000-yard stripping job. Between times it builds truck roads and maintains them. Fast worker for little "wages," with a long working life.

Savings you secure with modern mining techniques can be protected by using cost-cutting methods of doing the many odd jobs around the workings.

That's where International Diesel Crawlers get into the picture with their bulldozing power. Enjoy the advantages which their unbeatable operating economy offers. Use them to remove overburden; to move, dress and level spoil banks; to build and maintain roads; to skid supplies and equipment.

They save labor, time and money—which makes them cost-cutting champions.

Specifications and other information about International Diesel Crawlers and the matched equipment to use with them are available at your International Industrial Power Distributor.

Industrial Power Division

INTERNATIONAL HARVESTER COMPANY

180 North Michigan Avenue • Chicago 1, Illinois

INTERNATIONAL *POWER*

CRAWLER AND WHEEL TRACTORS • DIESEL ENGINES • POWER UNITS

Get these *EXTRA* Bonuses with *WALTER TRACTOR TRUCKS*

EXTRA **TONS.** Walter Tractor Trucks are hauling 30-40—up to 60 ton payloads in open pit mining . . . at speeds equalling smaller trucks. Each trip delivers much greater tonnage per truck, per driver. Fewer trucks are needed to keep your shovels and plant working at capacity.

EXTRA **WORKING DAYS.** Walter Tractor Trucks haul in any weather, any running conditions, any season. They haul payloads or overburden. They keep working when all other trucks are stalled by bad running conditions.

EXTRA **AVAILABILITY.** Walter Tractor Trucks are carefully and ruggedly built. They stand up under the most gruelling operation — need minimum time out for repairs. They are steady producers that quickly pay their way in greater output.

HERE'S THE REASON! Only Walter Trucks have the 4-Point Positive Drive to provide unfailing, 100% traction in all four driving wheels. Three automatic locking differentials proportion engine power to each according to its traction at any instant. There is no wheel-spinning to bog down loads, rip up roads or wear tires.

Get the full story. Write for literature explaining the many unusual features of Walter Tractor Trucks for open pit mining.

WALTER TRACTOR TRUCKS

WALTER MOTOR TRUCK COMPANY, 1001-19 Irving Ave., Ridgewood 27, Queens, L. I., N.Y.

use this Gold Mine ...for your Coal mine

Chart shows how BP process gives gear teeth great strength and toughness from surface through core.

You can see at a glance why you get more trips per dollar* with Westinghouse BP gears, by checking the chart shown above.

For the chart shows the sharp drop in hardness which causes chipping and cracking common to other methods of heat-treatment, while the exclusive BP treatment produces a gear with a graduated hardness from the tooth surface to the core. This treatment assures a surface hardness to resist wear with a tough ductile structure to resist severe shock loads.

Actually, you get a gear hardened specifically for mine service . . . great strength, toughness and high resistance to abrasion. Ask your nearest Westinghouse office for all of the facts on BP heat-treated gears for mine locomotives. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-07256

**just like finding a gold mine*

Westinghouse

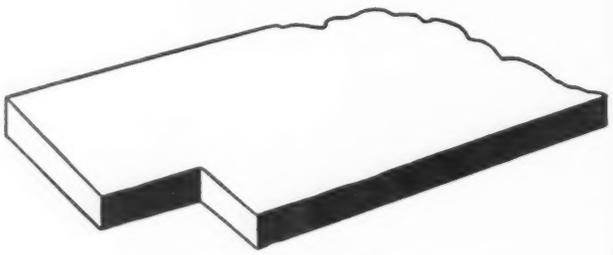
PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

BP Gears

UNION PACIFIC

TREASURE MAP OF INDUSTRY

Nebraska*



* *One of a series of advertisements based on industrial opportunities in the states served by the Union Pacific Railroad.*

- LARGE SOURCE OF FARM PRODUCTS
- LEADER IN DAIRY PRODUCTS
- MAJOR LIVESTOCK PACKING AND PROCESSING CENTER
- AMPLE WATER SUPPLY
- NATURAL GAS, COAL, OIL AND ELECTRIC POWER
- RICH MINERAL DEPOSITS
- DIVERSIFIED INDUSTRIAL ACTIVITY
- STRATEGIC DISTRIBUTION LOCATION
- EXCELLENT RAIL TRANSPORTATION
- SKILLED, FAIR-MINDED LABOR
- NO SALES OR INCOME TAX

Industries engaged in the packing or processing of farm products find Nebraska a rich source of raw materials. Corn, grains, sugar beets, potatoes and other vegetables are grown in abundance.

Omaha is a leading meat packing and poultry processing center. It frequently leads the nation in livestock receipts, is located in the world's largest butter producing area, and houses the nation's second largest industrial alcohol plant.

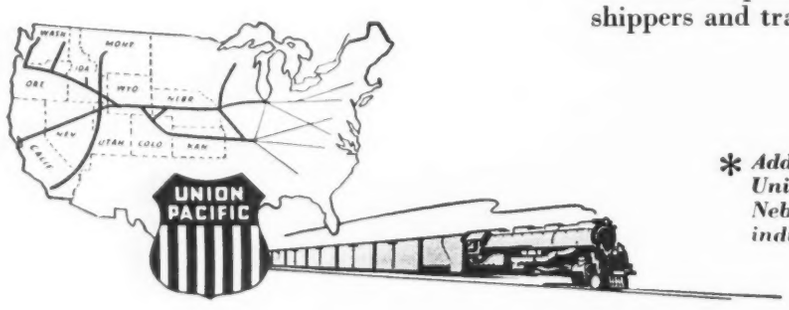
In addition to agricultural activity, there is diversified industrial manufacturing such as farm machinery, air conditioning equipment, fabricated steel, brick and tile.

Nebraska has large mineral deposits; gypsum, salt, potash, sand, gravel, stone, etc. Natural gas, petroleum and coal are readily available.

Of particular interest to industry is Nebraska's "pay-as-you-go" policy; no state sales, income or luxury taxes. It is a good place to work and live.

* * *

In Omaha are the headquarters of the Union Pacific Railroad which provides efficient, dependable transportation for shippers and travelers.

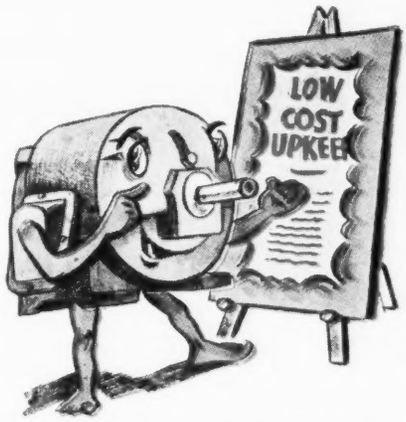


* *Address Industrial Department, Union Pacific Railroad, Omaha 2, Nebr., for information regarding industrial sites.*

UNION PACIFIC RAILROAD

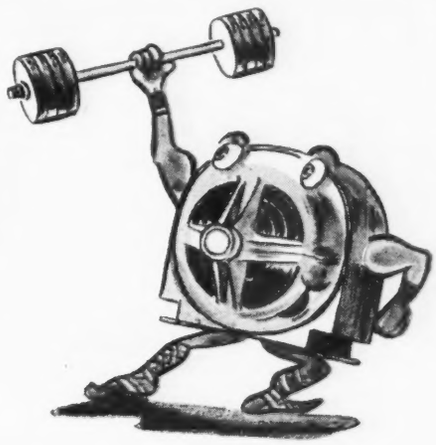
THE STRATEGIC MIDDLE ROUTE

"Puzzled over which type of motor to buy?"

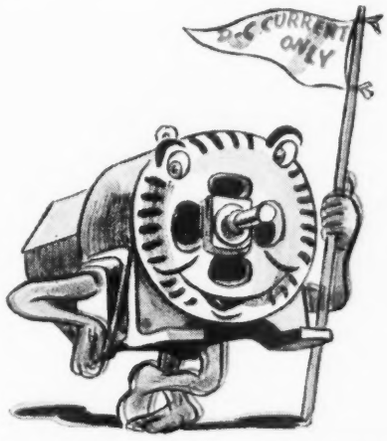


In 80% of the Cases, open squirrel-cage induction motors meet the need. They fit most drives, and can be obtained in numerous standard and special designs to meet varying conditions of starting torque, slip, etc. They are also the most economical type to buy and to maintain. Allis-Chalmers builds induction motors in sizes from ½ to 10,000 hp — or higher, if needed.

For Tough Starting Conditions, wound-rotor induction motors are recommended. Their high starting torque, at comparatively low starting current, and their controllable speed characteristics are desirable in drives for conveyors, grinding mills and other tough starting assignments. Compact, accessible Allis-Chalmers wound rotor induction motors range in size from 5 to 10,000 hp.



For Slow Speed, direct-connected drives as low as 75 rpm, or other constant speed applications at higher rpm, synchronous motors are a good solution. They are of particular benefit when a system's power factor is low, since they can be furnished for operation at either unity or leading power factor. From 40 hp to 50,000 hp and higher — in bracket bearing, pedestal bearing, or engine types.



Is d-c Available? Then adjustable speed operation is easily obtainable. Allis-Chalmers builds d-c motors from ½ to 10,000 hp and higher — for constant or adjustable speed duty in ranges of 6:1 and lower. By means of a source of d-c voltage, adjustable speed motors may also be designed to operate over a speed range as high as 30:1. Suitable for fans, elevators, etc.

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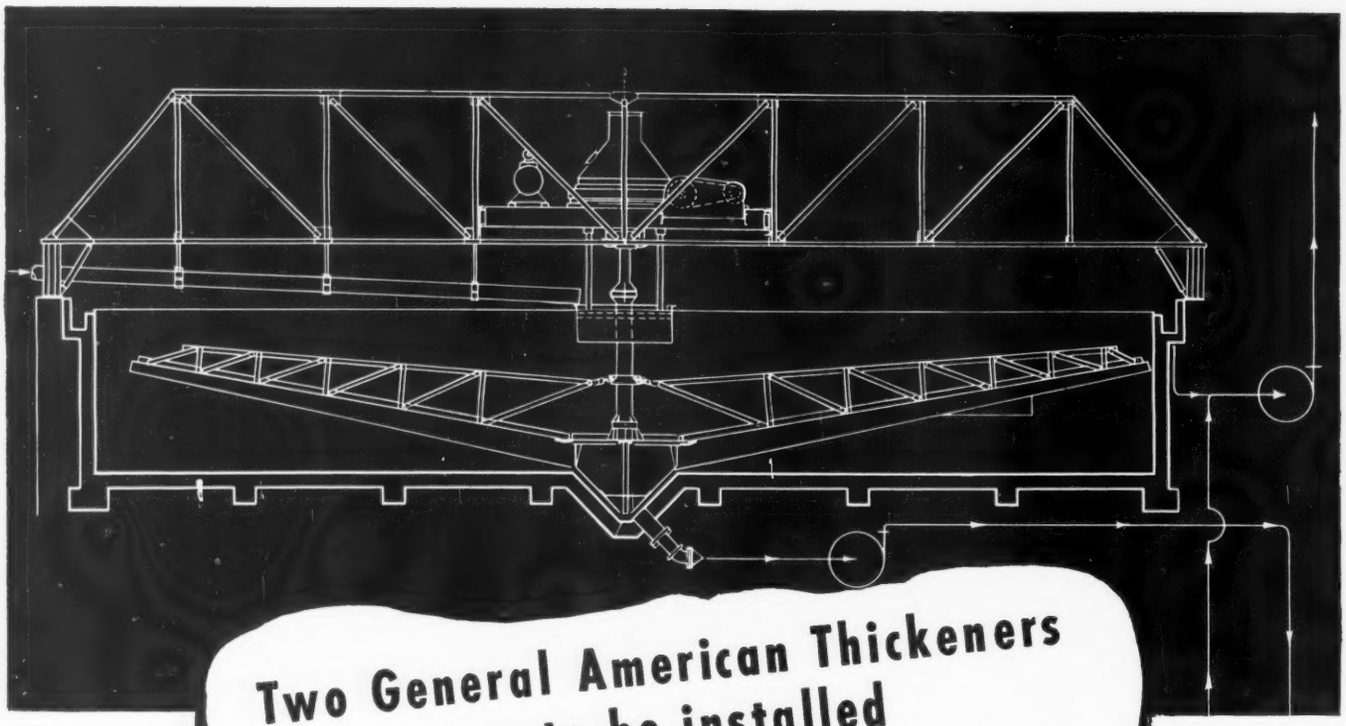

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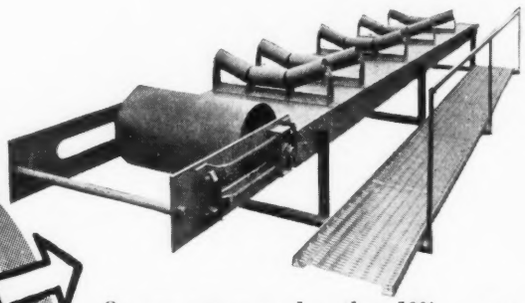

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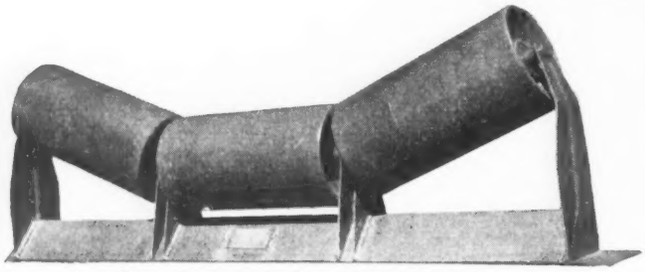

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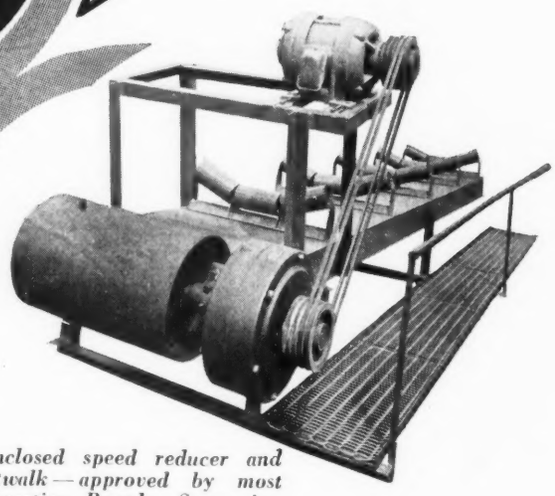

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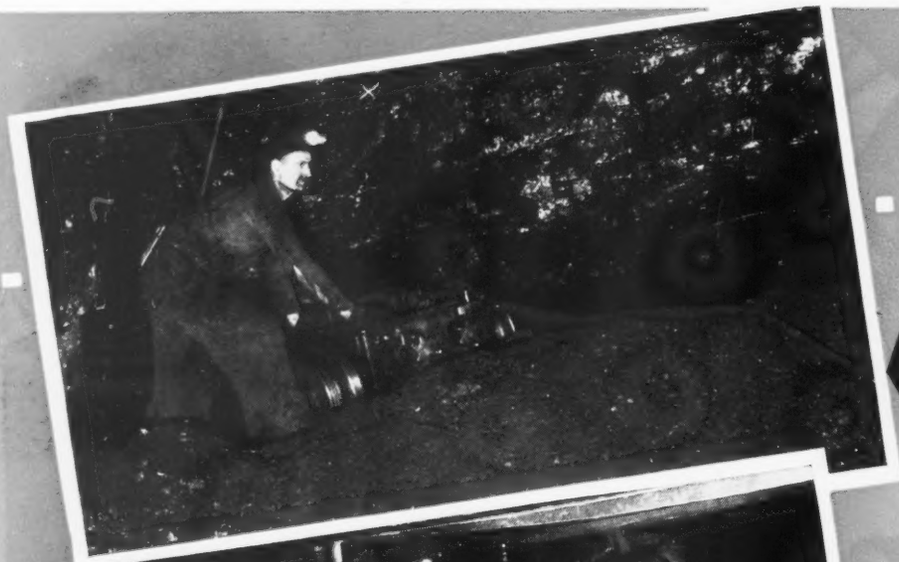

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Devoted to the Operating, Technical and Business Problems of the Coal-Mining Industry

Coal Age

SEPTEMBER, 1947

IVAN A. GIVEN, EDITOR

Still the Best

A DOSE of compulsion is now the Labor Party's recipe for making socialization work in Great Britain. While not unexpected, this step is the highly ironical result of a long-continued campaign by British labor leaders and their sympathizers to eliminate private enterprise and make government the sole employer. The result? As in other countries that have tried the same thing, it is a decision by the government that the citizen must work where he is told. Announcement of this new British policy Aug. 6 was foreshadowed July 15 by Arthur Deakins, general secretary, Transport and General Workers' Union, who declared that British labor "must of necessity accept a limited measure of direction." It would seem that labor leaders would be the last to consent to abridging individual rights. Yet now, at least one finds it easy to advocate taking away from the individual one of his greatest freedoms: the right to choose his work.

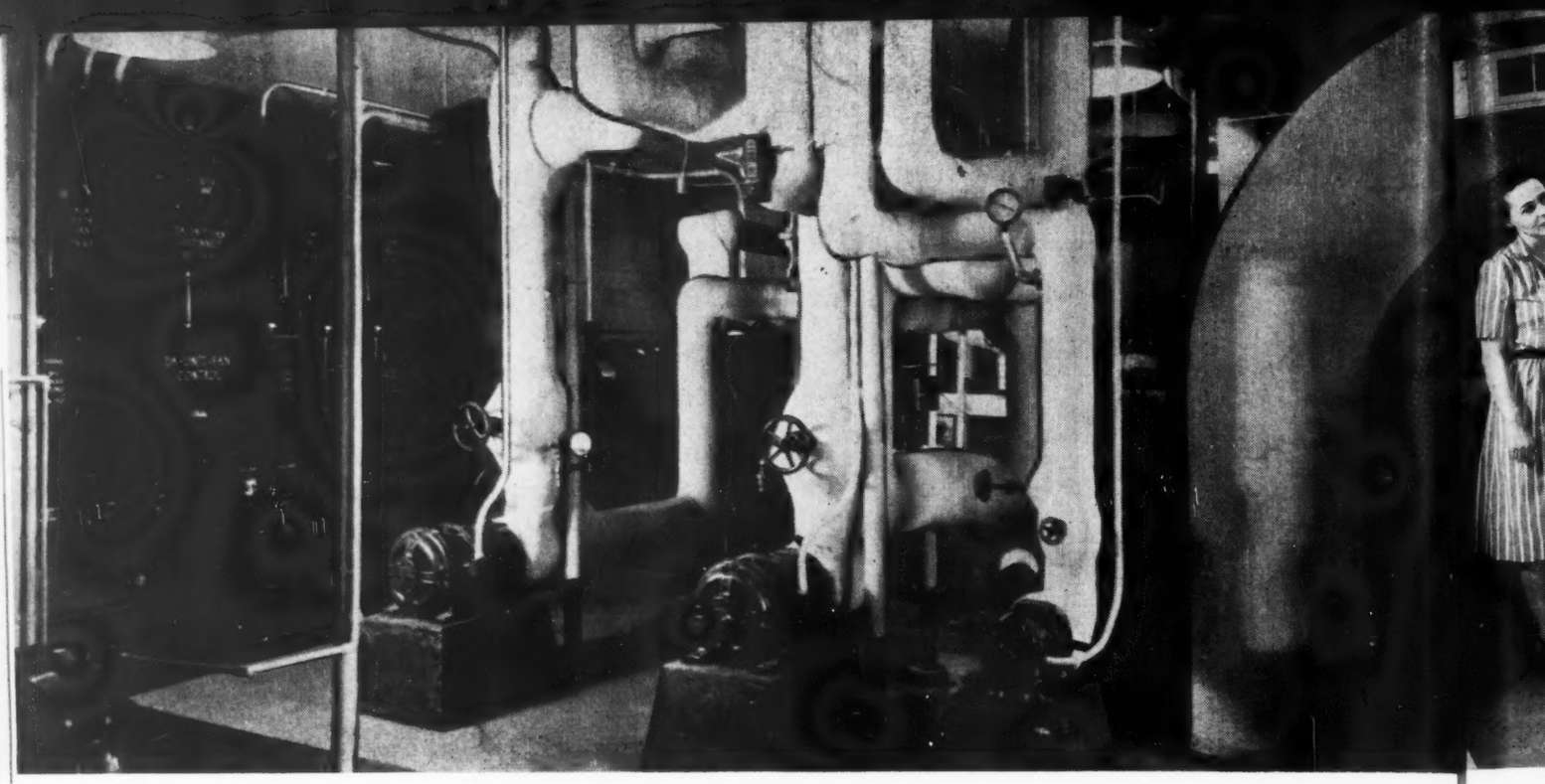
Why the Labor Government feels it must resort to compulsion probably will be debated at length. But study of the history of government interference with business makes the picture a little clearer. To make a profit under the free competitive system, employers must produce—and produce efficiently. When the government becomes the sole employer, that most powerful of incentives disappears. In addition, when, as in Great Britain, nationalization has been sold on the basis that the individual will get more for less work—further lessening the incentive to produce—it is not surprising to find conditions getting worse. Neither is it surprising that those who attained power by working this oldest of shell games should, when confronted with the inevitable result, resort to compulsion to overcome their failure to provide the better life.

Those who favor elimination of private employment, whether they call their nostrum socialism or communism, are fond of declaring that the step is necessitated by management failure. There is no doubt that such failure contributes to making the arguments for nationalization sound more plausible. However, excessive government interference can cause even the best of management to fail. This country, happily, has escaped the fate of Great Britain—at least so far. But, as the coal industry well knows, attempts still are being made to extend the power of government—and of labor-union monopolies—over management and the worker, using the same "something-for-nothing" argument. If left unchecked, this pressure conceivably could result in the same elimination of private employment and substitution of worker compulsion here, too. Perhaps the possibility is not too great, but it cannot be said that it does not exist. Private enterprise still stands as the best means of preserving individual freedom and of providing more things for more people. To make certain that the Nation continues to enjoy the benefits it provides, management must make sure that all workers and the public understand these advantages—and the hazards of the proposed alternatives.

Dusting Limits

SINCE COAL MINING involves the handling of explosive material in millions of tons, with methane as a further complication, the explosion hazard always will be present. But the hazard becomes an actuality only when coal dust or methane is mixed with air in the right quantity and a spark or flame is present to set it off. If the chain is broken by eliminating fires or sparks, or by diluting methane with air, or coal dust with rock dust, an explosion cannot take place.

But since the possibility of an ignition always exists, it also is necessary to take steps to limit any possible explosion to the smallest possible area. This brings in the limits of rock dusting—a subject of considerable recent discussion. One suggestion is that as soon as a crosscut is made, it, and the working place behind, should be thoroughly treated. There is logic in this because, with all crosscuts properly dusted, a dust explosion is confined to one place and cannot, as is possible with other dusting standards, spread through the crosscuts to, possibly, an entire working section.



THIS LARGE HEAT PUMP serves Ohio Power Co. offices in Portsmouth.

The Heat Pump: New

Providing Winter Heating and Summer Cooling With the Same Unit, the Electrically Powered Heat Pump Shapes Up as a Promising New Weapon in Coal's Fight for the Year-Round Comfort Market

DELIVERY of three to five or more units of heat per unit of energy bought in winter, plus cooling comfort in summer, is the promise of the heat pump, a dual-purpose reversible heating and cooling unit that draws outside heat from air, water or the earth and uses electricity to power the cycle. Performance efficiency of the heat pump still must be engineered upward and installation and operating costs downward. The fact remains, however, that the heat pump works.

If the potential heat-pump market were completely realized, it is estimated that it would require some 100,000,000 tons of coal a year for electric power for winter operation, plus an additional 25,000,000 tons or so for summer cooling. For the power industry, selling this market would mean a vastly increased load factor in the profitable residential brackets and an answer to the high cost of heating homes with electricity on a direct-conversion basis. For the homeowner, the office worker and the factory employee, it would mean clean, trouble-free warmth in cold weather and comfortable living and working space in the summer months.

Heat Pump's Secret

The secret of the heat pump is its ability to take heat diffused throughout a medium-temperature heat source and cram it into a small, tight package. Its efficiency is measured by the ratio of total energy delivered to energy purchased for operation. Thus, if 1 kw.-hr. of electricity (3,414 B.t.u.) bought to run the compressor enables the heat pump to deliver 10,242 B.t.u., then total heat output—the sum of heat extracted from the source and the heat of compression—is 13,656 B.t.u. and the ratio of total energy delivered to energy purchased is four to one. The "Coefficient of Performance," then, is 4. If the heat pump can be engineered for a performance coefficient of 3.5 or more—some experimental designs already have done better than this—it can begin to hold its own competition-wise against conventional fuels.

Basically, the heat pump comprises four main units: compressor, expansion valve, condenser and evaporator. This simple assembly, with the help of a refrigerant like freon and a minimum of purchased energy, extracts heat from a medium-temperature source and puts it to work in a refrigeration cycle. The only difference between the heat pump and an ordinary electric refrigerator is that the household refrigerator uses only the cold end of the cycle while the heat pump uses both the cold end and the hot end.

The physics of the heat pump is simple:

1. In the heating stage of the cycle, compression or condensation of the refrigerant crowds heat drawn from the heat source into a

Muncie Gear Works, Inc.

HOME HEAT PUMP uses about 11,000 kw.-hr. a year for winter heat, summer cooling.

Coal Outlet?

small volume, producing high temperatures in the refrigerant. Then a circulating system (forced air or hot water) picks up the heat from the compressed refrigerant and distributes it to heat a house or an office building.

2. In the cooling stage of the cycle, expansion or evaporation of the refrigerant increases the volume and thus reduces heat per unit of volume. The refrigerant, now expanded and cold, picks up heat from the circulating system and transfers it to the outside, thus cooling the house.

Heat Flows Downhill

This reversible arrangement capitalizes in heat's natural downhill flow—from a hot, compressed refrigerant to a living space that needs heating, or from a living space that needs cooling to a cold, evaporating refrigerant (Fig. 1).

The coefficient of performance varies with several factors: the inside temperature desired, the temperature outside, the mechanical efficiency of the compressor and the temperature of the heat source.

The heat pump, as pointed out, draws heat from commonplace sources—air, water or the earth. It could draw heat even from an iceberg, though in this case the coefficient of performance would be extremely low and the operation correspondingly more costly. For an acceptable coefficient of performance, the average year-round temperature of the heat source should be between 40 and 80 deg. F.

One universal storage place for nature's heat is outside air. Up to now, it has been most often used for the operation of heat-pump units. It has the advantage of abundance, availability and ease of movement and there are no disposal problems. In addition, it is free.

When used for summer cooling in climates where winter temperatures are very low, the coefficient of performance of an air heat pump is likely to be high, since the difference between desired inside temperatures and existing outside temperature usually is small in such regions. But a heat pump that pulls warmth from outside air is not always cheap. As the gap between outside source temperature and desired inside heat widens, the coefficient of performance falls rapidly. In other words, when there is least heat in the outside air, inside demands will be highest and more kilowatt-hours will be needed to pump enough heat into the living space.

Likewise, in extremes of cold, a great volume of air must pass over the heat exchangers and therefore they must be large. Increased size means high initial cost and a huge volume of air probably would involve noise from blowers and vibration from the heat exchangers.

In regions with low winter temeratures, auxiliary heat probably would have to be provided. This could be done with hot water stored when heat demands are low, or by auxiliary heaters burning solid, liquid or gaseous fuels.

Another obstacle for the air-source heat pump is that frost sometimes forms on the outside coils and blocks heat absorption. Engineers are solving this problem, though, by temporarily reversing the cycle, spraying with water at 50 deg. F. or more, applying electric strip heaters, using dual coils alternately and by other means.

Another heat source for the heat pump is ground water from a well sunk to some practicable depth, say 200 ft. Well water has the advantage of a dependable year-round temperature of 50 to 55 deg. F. in most regions. But well water is not always available on home or commercial property and, if available, the quantities demanded—from 180 to 400 gal. per hour or more for a home heat pump—might soon exhaust the supply. Also, disposal of the water after use might tax or exceed the capacity of most city water-disposal systems.

Use of Well and City Water

It might be possible, of course, to deliver used water to another well near by, if there was one. One thing is sure: the used water cannot be returned to its source, because a closed cycle such as this soon would exhaust the heat of the well water. In one experiment with a closed cycle—from well to heat pump to original well—the temperature of the well water dropped 20 deg. F. in a few hours and did not build up to normal again for 40 hours after the heat pump had been switched off.

As for city water as a heat source, the same objections may be lodged against it as against well water, plus the obstacle of cost, which may be high enough in most cities to cancel out a very high coefficient of performance. In either case, the water used must be chem-

BASIC HEAT-PUMP SYSTEM AND THREE DESIGNS

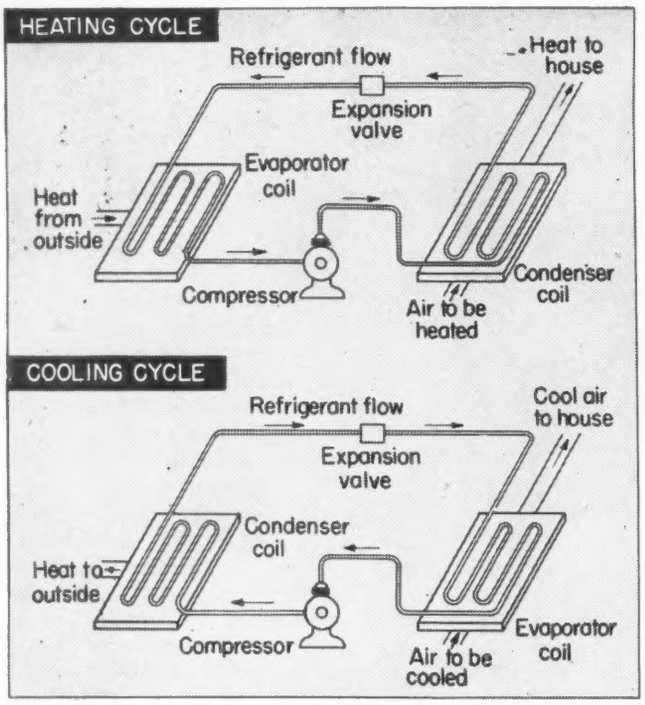


FIG. 1—BASIC DESIGN has compressor, expansion valve, condenser, evaporator. Refrigerant reverses with seasons.

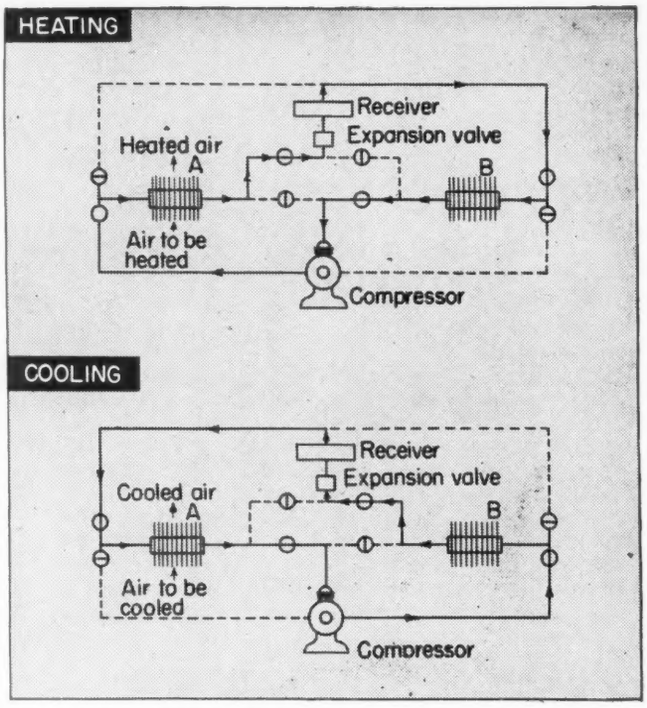


FIG. 2—AIR-TO-AIR design carries warmth from winter air to inside air. In summer, it discharges heat to outside air.

ically suited so as not to clog or corrode pipes.

Theoretically, the earth itself is a good heat source. Some 28,000,000 B.t.u. can be drawn from a cylinder of earth 30 ft. in diameter and 100 ft. deep while its temperature drops only 10 deg. F. Heat-pump delivery of 50,000 B.t.u. per hour from this cylinder of earth, plus the heat of compression, for 20 percent of the time over a five-month heating season, likely would meet home-heating requirements even if no more heat flowed into the earthen cylinder.

Getting the earth to give up its heat, however, is a stubborn problem and engineers, manufacturers and universities still are gathering data on heat-transfer coefficients for different types of soil under various conditions of moisture, compression, content, etc.

Heat from Air

Adding it all up, air seems to be the most practicable heat source for the heat pump, especially if winter temperatures do not fall to extremes of cold except for short intervals. In locations where natural conditions are right, well water may be more satisfactory than air. Information on earth as a heat source still is limited but there seem to be possibilities of using it successfully.

The basic assembly of the heat pump—compressor, expansion valve, condenser and evaporator—may be modified to achieve several combinations of heat source, circulating system and direction of refrigerant flow.

An air-to-air design—Fig. 2, for example—uses outside air as a heat source and inside air, warmed by the condenser, to heat the living space. For cooling, the evaporator removes heat from the inside air and discharges it to the outside air through the compression coil. A system of valves somewhat like those shown may be used to reverse the refrigerant flow and to bypass parts of the system temporarily not in use.

Air-to-Air System

When used for heating, the refrigerant, condensed and heated by compression, passes from the compressor to the finned Surface A and there gives up its heat to circulating inside air, which carries it to the living space. The refrigerant moves on to the liquid storage receiver and through the expansion valve. Now vaporized, expanded and cold, the refrigerant draws heat from outside air through the finned Surface B and then flows into the compressor to repeat the cycle.

For cooling, the flow of the refrigerant is reversed by closing off parts of the system and opening others, as indicated. From the expansion valve, the cold, gaseous refrigerant flows through the fins at Surface A and absorbs heat from inside air forced over the fins. Moving along through the compressor, the refrigerant, liquefied and heated by compression, ejects its heat to the outside air that passes over Surface B.

Air Flow Reversed

Another design, instead of reversing the refrigerant flow, obtains the same results by reversing the flow of air (Fig. 3). For heating, inside air passes over the condenser, picks up warmth and carries it to the living space. For cooling, inside air passes over the expansion coil, or evaporator, and gives up its heat.

A third type of heat pump is designed for air-to-liquid transfer, with outside air as the heat source and water as the heat-carrying agent (Fig. 4). Here, the compression coil is immersed in one tank of water and the expansion coil in another. One pump circulates the water through a closed system over the evaporator coil. Another pump sends water through a second closed system over the condenser coil. For heating, the water in System A bathes the condenser coil and absorbs heat. Then, moving on to the heating fins, the water discharges heat to inside air circulating over the fins. The refrigerant, moving through the expansion valve, where it is gasified and chilled, draws heat from System B and brings it back to the compressor to renew the cycle.

For cooling, water in System C,

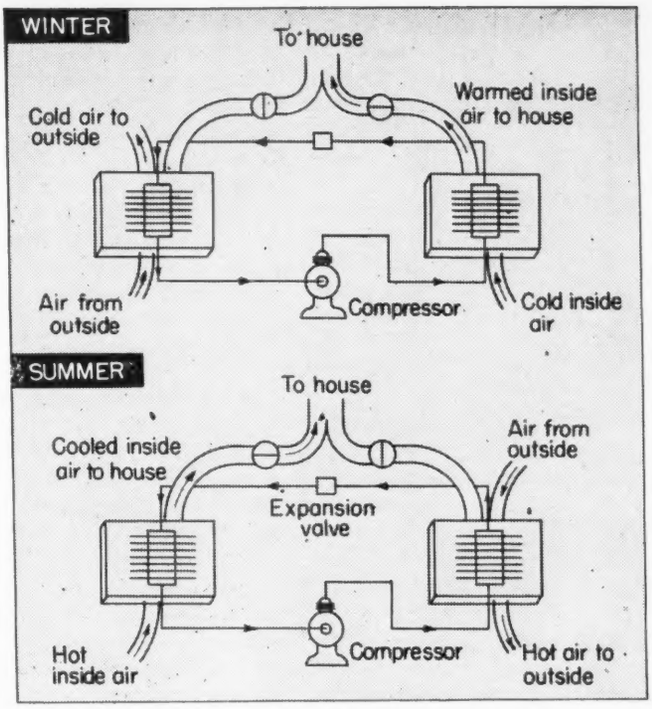


FIG. 3—REVERSIBLE air flow in this modification keeps refrigerant moving always in the same direction.

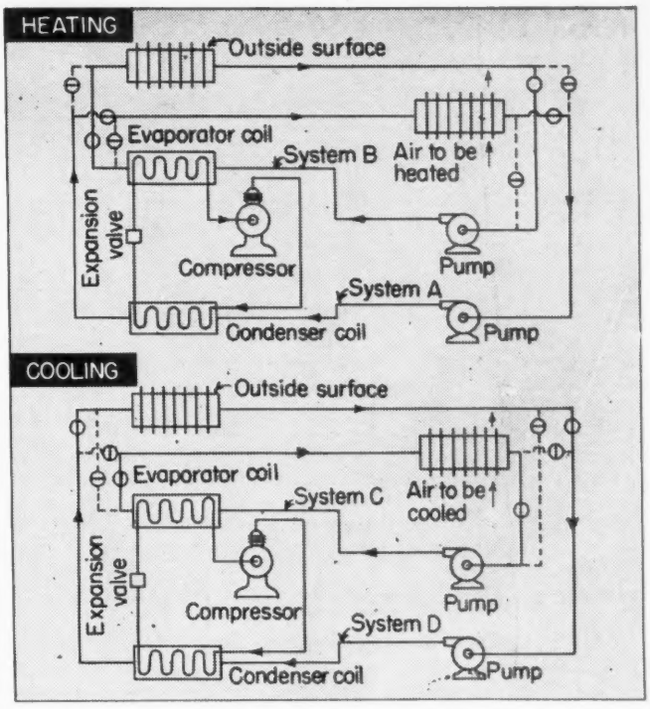


FIG. 4—AIR-TO-LIQUID design uses a dual water system with valves and twin pumps. Refrigerant flow is fixed.

passing over the evaporator coil, surrenders heat to the refrigerant and returns to a finned surface, where it absorbs more heat from living-space air and thus cools the house. The refrigerant, meanwhile, passes through the compressor and into the condenser coil, where it transfers heat to System D for discharge through fins to the outside air. It then returns through the expansion valve to start the cycle again. In this design, valves control changeovers from cooling to heating and back again and the refrigerant flows always in the same direction through its own closed cycle.

Water-to-Water Design

A water-to-water design for a heat pump uses water as a heat source and as a transfer agent from compressor and evaporator. A deep-well pump circulates ground water through the system and then pumps it out for disposal. Meanwhile, another pump forces house-conditioning water over the coils of the system and through the house. For heating in winter, ground water passes through the system and over the evaporating coil while house-conditioning water passes over the condenser coil. For summer cooling, ground water flows over the condenser coil and house-conditioning water over the evaporator coil.

In addition to winter and summer air conditioning, the heat pump also can provide hot water at temperatures from 120 to 150 deg. F. the year around (Fig. 5). Heat sources are the same as those used for air conditioning and the equipment is identical except for the necessary piping and a storage tank. Because the coefficient of performance averages from 2.5 to 4 or more, operating costs are less than for a comparable electric-resistance water heater, whose performance coefficient, even at 100-percent efficiency, is only 1. In addition to heating water, this unit can cool and dehumidify household air if the air is forced over the fins of the expansion coil. In that event, the water will be heated, at least in part, by warmth drawn from living-space air.

Comfort for Office Buildings

Some 50-odd heat pumps already are installed and working in the United States, from Connecticut to Louisiana and from New Jersey to California. They are providing year-round air conditioning in offices, commercial buildings and homes. For example, the Ohio Power Co., a subsidiary of the American Gas & Electric Corp., has installed heat pumps in three of its buildings, one at Steubenville, Ohio, and, in 1940, one at Portsmouth, Ohio, and another at Coshocton. The Coshocton installation, located in the basement and using a water-to-water design, operates at a coefficient of performance of 3.3 to 4, with a year-round average of 3.6. In the Portsmouth building, an air-to-liquid system installed on the fourth floor turns in an average performance coefficient of 3. The Steubenville heat pump, air-to-air design, has a coefficient of performance of 2.9 when the outside temperature drops to 0 deg. F. and 3.2 at 50 deg. F.

Air-Conditioned Homes

Several heat pumps have been installed in homes throughout the country. A unit in a 20,000-cu. ft. house in Riverside, Calif., with city water as the heat source, has a coefficient of performance of 5.13. Another in a 10,880 cu.ft. house in Boise, Idaho, works with a coefficient of 3.33, using well water as the heat source. In Mojave, Calif., a heat pump in a seven-room house, using outside air as a heat source, has a performance coefficient of 1.84 to 3.29, respectively, for outdoor temperatures of 25 and 70 deg. F. In a 7,000 cu.ft. home in Indianapolis, a heat pump installed in 1945, with earth as the heat source, has a coefficient of performance of 3.61.

Although figures like these make it clear that the heat pump works, their range indicates also that costs have not yet firmed down. On the other hand, it would be unfair to compare initial and operating costs of the heat pump, which provides year-round air conditioning, with those of the conventional heat-

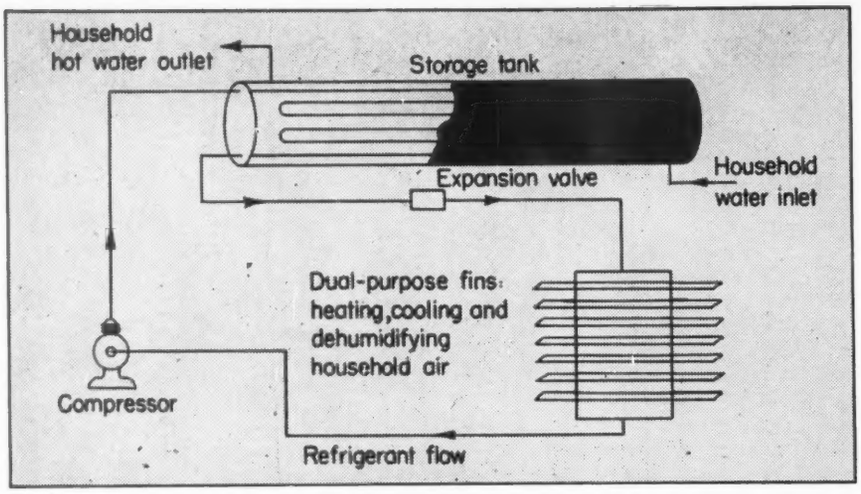


FIG. 5—WATER HEATER supplies hot water at 120 to 150 deg. F., plus air cooling and dehumidifying in summer.

TABLE I—Equivalent power and fuel prices at which the heat pump can compete

Coal, per ton		Gas, per 1,000 cu. ft.		Oil, per gal.	Power, per kw-hr.
12,000 B.t.u.	14,000 B.t.u.	550 B.t.u.	1,000 B.t.u.		
15.30	17.85	35.1c.	63.6c.	7.8c.	1½c.
20.40	23.80	46.8c.	84.8c.	10.4c.	2c.
30.60	35.70	70.2c	$1.272	15.6c	3c

American Gas & Electric Service Corp.

ing system, which works only in winter.

Just now, the most inviting field for the heat pump appears to be in moderate climates, where the coefficient of performance is likely to be acceptable and where the heating and cooling loads are approximately in balance. This will assure moderate operating costs, compact construction and, for the power company, a year-round power load. Areas such as the Tennessee Valley and the Pacific Northwest, where low power costs can be combined with temperate climates, are especially suited for efficient use of the heat pump.

How the Heat Pump Competes

With improved engineering, which is on the way, the heat pump soon may approach the economy of coal, oil and gas. Philip Sporn, vice president and chief engineer, and E. R. Ambrose, air-conditioning engineer, American Gas & Electric Service Corp., have estimated comparative costs for the heat pump and conventional fuels (Table 1). Assuming a coefficient of performance of 4.5 for the heat pump and 65-percent efficiency for fuels, they find that the heat pump is fully competitive with coal when electric energy sells for 1c. per kw.-hr. and 12,000-B.t.u. coal for $10.20 a ton.

Mr. Sporn also has estimated the monthly kilowatt consumption for a heat pump in an average, well-built six-room house in the Pittsburgh area. The coefficient of performance of the heat pump is assumed to be 4.5. Also, a 1,000-gal. tank is assumed for off-peak storage. Total yearly consumption, he estimates, would be 10,900 kw.-hr. —8,900 for heating and 2,000 for cooling—as contrasted with present average domestic consumption of 2,075 kw.-hr.

With engineering studies under way, Mr. Sporn's assumption of a 4.5 coefficient of performance may not be far in the future. Hermetically sealed compressors of the proper capacity for domestic heat pumps, from 3 to 5 hp., are becoming available. Improved heat-transfer surfaces are being designed and the weight and size of heat exchangers are being pared down. Utility-company engineers and university scientists are gathering data on the merits of various heat sources.

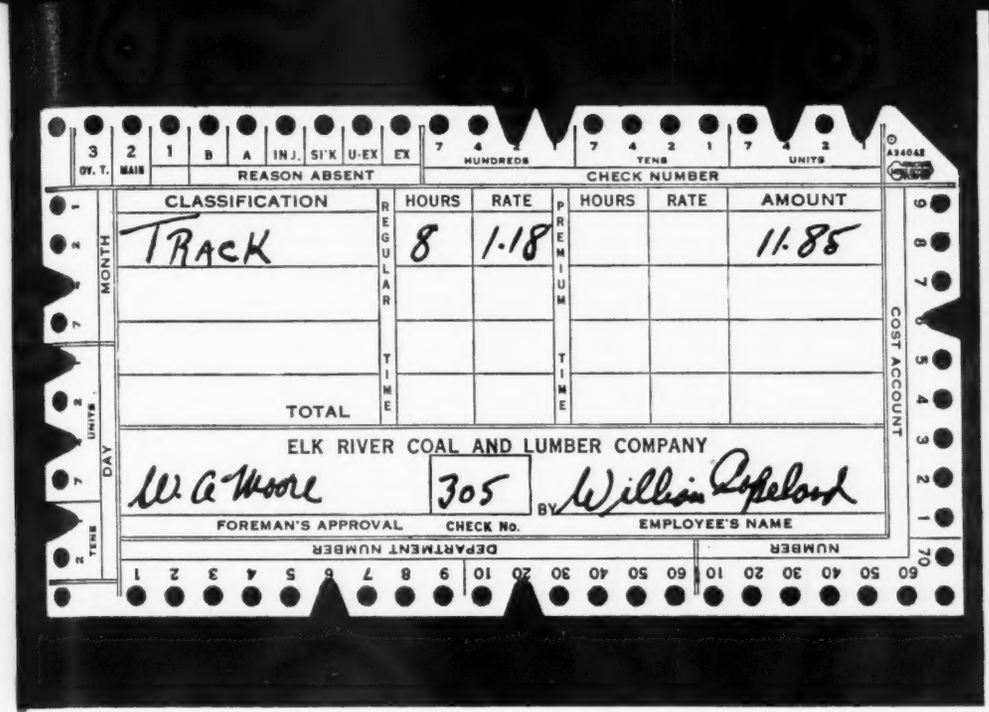
To speed up the availibility of heat-pump data, get the public used to the heat pump and give manufacturers an opportunity to firm down on cost estimates, the utility companies recently have submitted specifications and asked for bids on 10,000 heat-pump water heaters and 1,000 heat pumps for home service. First deliveries of water heaters are expected late this fall: of air-conditioning units, midsummer, 1948.

Whatever system may be used—air-to-air, air-to-water, water-to-water, earth-to-air or earth-to-water—the heat pump offers several operating advantages over conventional heating and cooling systems. Integration of heating and cooling units reduces space requirements. Specifications for the 1,000 domestic heat pumps now on order, for instance, call for a housed assembly measuring no more than 3½ ft. wide, 6 ft. long and 6½ ft. high. In addition, the heat pump's flexibility permits it to be located almost anywhere—on the roof, in the basement or in a floor-level utility room. If it fulfills all it promises to do, it will bring to realization the all-electric home, providing not only space heating and cooling as well as hot water, but also refrigeration, freezing and even, possibly, steam-table cooking.

The heat pump also may bring substantial changes in house design. The basement—a high-cost item in construction—can be eliminated and the heat pump placed in the attic. There will be no chimneys to build and no passageways for ash removal. The heat pump may give a boost to radiant heating, which operates at lower temperature ranges than conventional systems, and thus may eliminate bulky hot-water radiators and air ducts. Since there is no combustion in the heat-pump cycle, smoke and fumes are banned and fire hazards are confined to electrical circuits.

Coal's Market Share

For the coal industry, full exploitation of the potential market for heat pumps—some 34,000,000 residential installations — would mean domestic consumption of about 155,000,000,000 kw.-hr. of electricity a year, about 5½ times as much electric power as was used in American homes in 1945. With utilities burning 1.29 lb. of coal per kilowatt-hour, this 155,000,000,000 kw.-hr. would represent 100,000,000 tons of coal per year for heat-pump power in winter, plus an additional 25,000,000 tons or so for hot water and summer air conditioning. Oil, natural gas and water power will be in the scramble for this new market, to be sure, but with shortages of oil and gas forecast for the not-too-distant future, coal has a good chance of snaring the lion's share for itself.



CLASSIFICATION: TRACK | REGULAR TIME HOURS: 8 | RATE: 1.18 | PREMIUM TIME HOURS | RATE | AMOUNT: 11.85 | TOTAL

ELK RIVER COAL AND LUMBER COMPANY

W. A. Moore — FOREMAN'S APPROVAL | 305 — CHECK No. | By William Copeland — EMPLOYEE'S NAME

1 DESIGNED for key sorting, this card, filled out by the miner himself (at right) speeds payroll preparation at Rich Run. Recorded are work done, hourly rate, check number and total earnings for the day.

Mechanizing Payroll Preparation

Cards Notched for Key Sorting Filled Out by Miners Are Basis of Labor-Saving Payroll Plan at Rich Run — Payroll Kept Up Daily and Cost Distribution Speeded

USE OF notched cards and a special pay statement, enlisting the help of the miner himself in reporting his time and earnings, and adoption of automatic sorting, have speeded up payroll work at the Rich Run mine of the Elk River Coal & Lumber Co., Widen, W. Va. With the new system, the substantial overtime previously involved in payroll preparation has been eliminated and the payroll is kept absolutely abreast of the work, with the results of the last shift worked the night before known and readily usable early the next day.

Adoption of the present payroll system at Rich Run dates back to December, 1941, shortly after the Jap attack that precipitated the

2 NOTCHING CARDS from the information entered by the miner is done at washhouse office after signing by the foreman.

3 CORRECTNESS of the miner's totaling of his earnings is checked by the rate clerk. Few errors are found in such checking.

4 FOR COST ACCOUNTING, the payroll cards are quickly sorted by means of a pin-type "key" which engages punched holes.

5 SORTING by check number is one step in preparation for posting earnings to the pay statements of employees.

6 THE PAYROLL is always up to date. Here, one clerk closes a payroll period as another starts a new one at Rich Run.

7 PROMPT AND ACCURATE information on the standing of employees is provided the company store by the Rich Run plan.

United States into World War II. Rich Run had been mechanized a few months before, bringing with it the satisfaction of a substantial production increase for the war effort. But Chas. C. Gressang, general superintendent, was less pleased with another phase of mine operation—payroll keeping—after stepping out for a breath of air one night and observing that the lights were still burning in the office although it was after eleven o'clock.

Investigation disclosed two men still working on the payroll, although they had it about licked. But Mr. Gressang decided then and there that a modern mine called for modern office methods. That determination was strengthened a few days later as he watched a dozen miners lined up at the pay window. The sums in their pay envelopes did not agree with what they thought was coming to them. Most of the complaints proved to be legitimate.

Investigation of various systems of speeding up payroll preparation resulted in adoption of a plan based on a McBee "Keysort" card, developed by the McBee Co., Athens, Ohio. The card, as shown, is coded for employee check number, department, cost account, date and, if absent, the reason why. The card is filled in by the miner at the end of the shift. He writes on the card the work performed, his check number, the hours worked, the rate and the total money due him for the shift. Then he signs it.

Any misgivings as to the miners' reaction were quickly dispelled when the new system went into effect. To quote Mr. Gressang: "Anybody around a mine knows that miners are slow to accept change. They generally are cool toward new methods and new tools —for a while at least. They'll even complain if you change the brand of powder. But they took to this Keysort card like a duck to water. Evidently a miner gets a lot of satisfaction out of entering into the company records in his own hand writing the amount due him."

When the card is completed by the miner, the signature of the foreman confirms the fact that he put in the hours and did the work recorded. To make possible subsequent automatic sorting according to date, check number, department and cost account, the cards are notched in the margin at the washhouse office. After notching, all the pertinent facts are easily and accurately distributed in subsequent payroll and

cost accounting by key sorting.

The next step is checking the accuracy of the miner's calculation of the amount due him. Stalie Walker, rate clerk, has found that they make few errors. "If a man has earned $13.05, he's not likely to pull a bad boner by writing down $5 or $22. When he works a regular shift, he rarely ever makes a mistake, since he has his day's pay memorized. When overtime is involved, there occasionally is a mistake, but it usually involves only a few pennies."

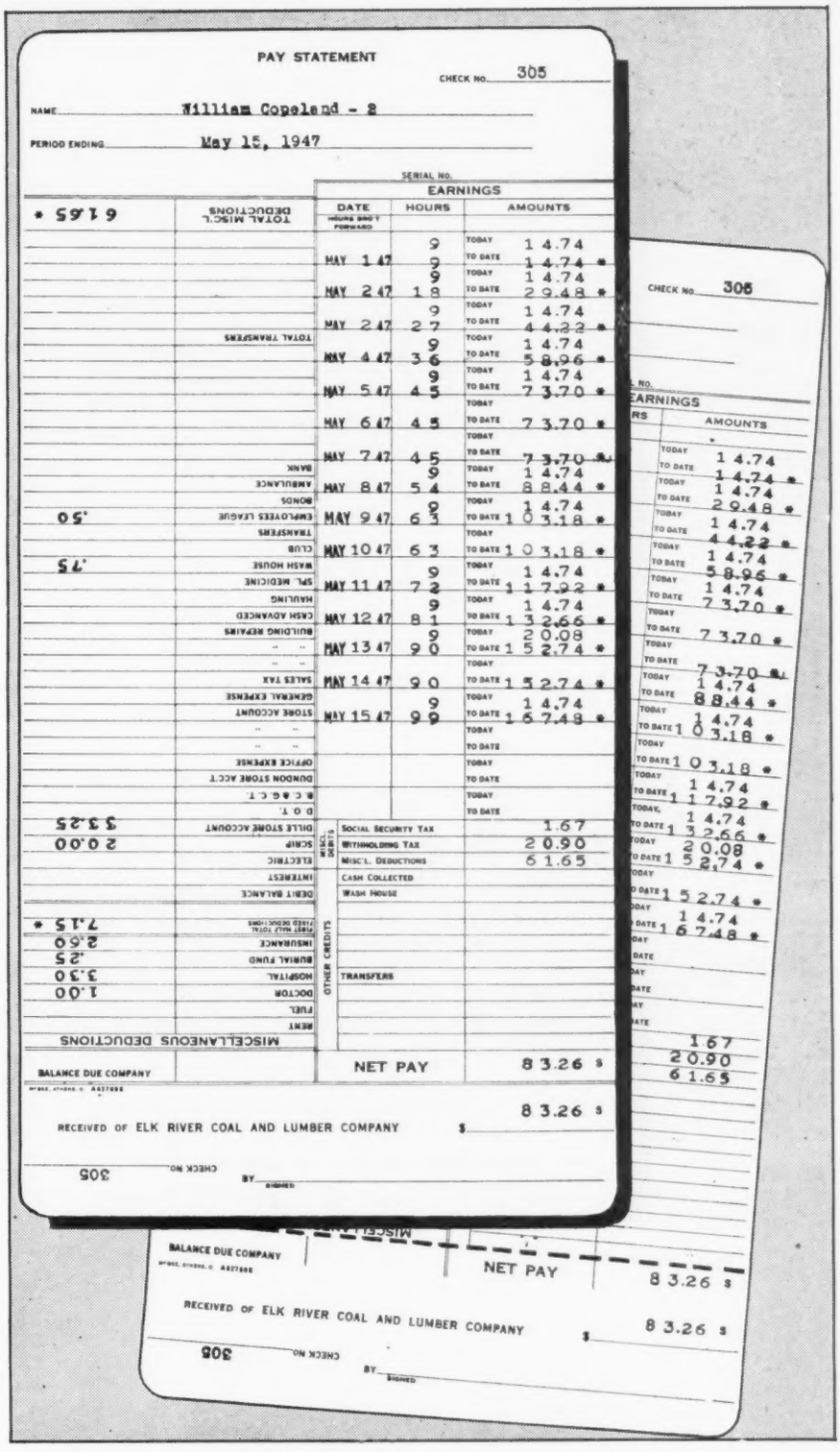
Costs Quickly Available

Cost accounting gets the Keysort cards next. Automatic sorting with metal punch pins permits arranging several hundred cards and distributing the items to the various cost accounts—timbering, shooting cutting, and so on, in a minimum of time. "It always has been important," Mr. Gressang notes, "to have accurate, up-to-the-minute costs. But it is even more important now than in 1941. In fact, it is absolutely essential to have costs in 24 hours. That is what we get."

The new system also facilitates work at the company's main office at Dundon, W. Va. One reason, observes Stanley Gibson, mine office manager, is the fact that "we now make up our own balance sheets. Dundon used to have to do it, using the bulky and cumbersome payroll journals we used to have to maintain under our old system." The ease with which the Keysort system went into operation was another point made by Mr. Gibson. "We had one day for rehearsal and started using it the next day. We haven't had a hitch since."

The payroll department gets the Keysort cards from cost accounting. They are sorted in accordance with employee number and the earnings are posted to each employee's pay statement. An accumulative pay record (see illustration) is kept. At the end of the pay period, deductions are made to arrive at the employee's net pay. A duplicate of the pay statement is given the miner. He signs the perforated end, tears it off, presents it at the pay window and collects his money. The originals are summarized on one sheet and the payroll journal is complete.

The fact that Rich Run now has less than ten pay disputes a year is confirmed by both Mr. Gressang and Mr. Gibson. The miners like the plan because they have found out from experience that the company knows to the penny what it owes each one. The company store often calls the office to get an okay for employees who are asking for credit. The okay comes through promptly even if the miner is so improvident as to be working against yesterday's earnings.



8 MINER'S PAY STATEMENT is cumulative and shows all deductions. The miner receives the duplicate copy, tears off, signs and presents at the pay office the perforated end (at bottom) when he collects his money.

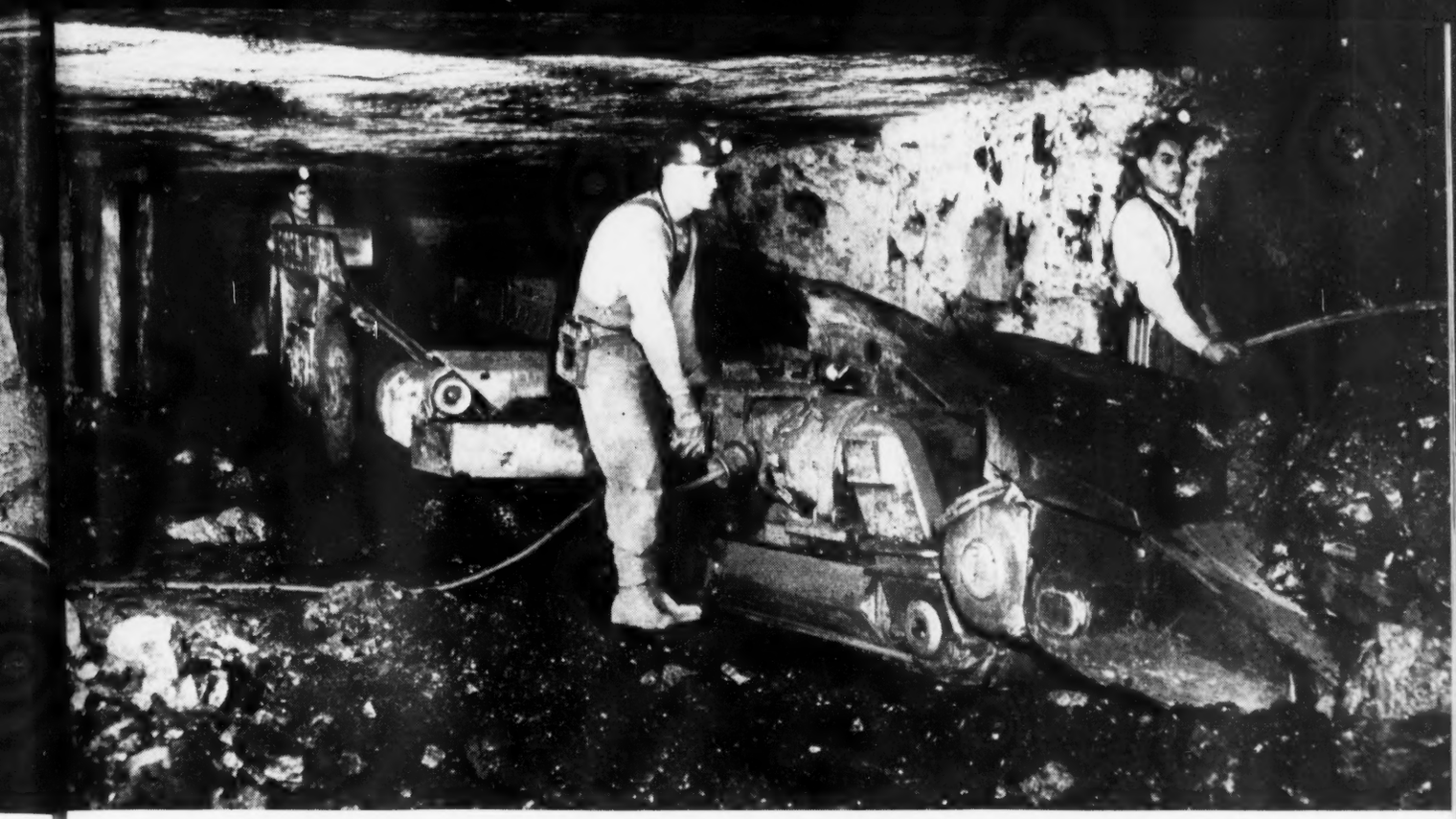
Summing up the results of the plan, Mr. Gressang reported that it "was installed originally because it wasn't fair to have our office employees work nights and Sundays. But now, from a strictly management viewpoint, we wonder how we operated without it. Certainly in this day and age it behooves management to pay its employees accurately and on time and to have accurate and up-to-date costs. These are the conditions at Rich Run as a result of this method."

THE MOTHER BELT PULLS COAL up an average grade of 7 percent achieved by driving slightly off the full 9.8-percent dip.

Belt Pulls Shuttle-Car Output

Belt on 7-Percent Grade Solves Problem of Pulling Coal Out of 9.8-Percent Dip Section Using Shuttle Cars and Loader—Mining Done Successfully Over Seam Worked Out and Caved 50 Ft. Below

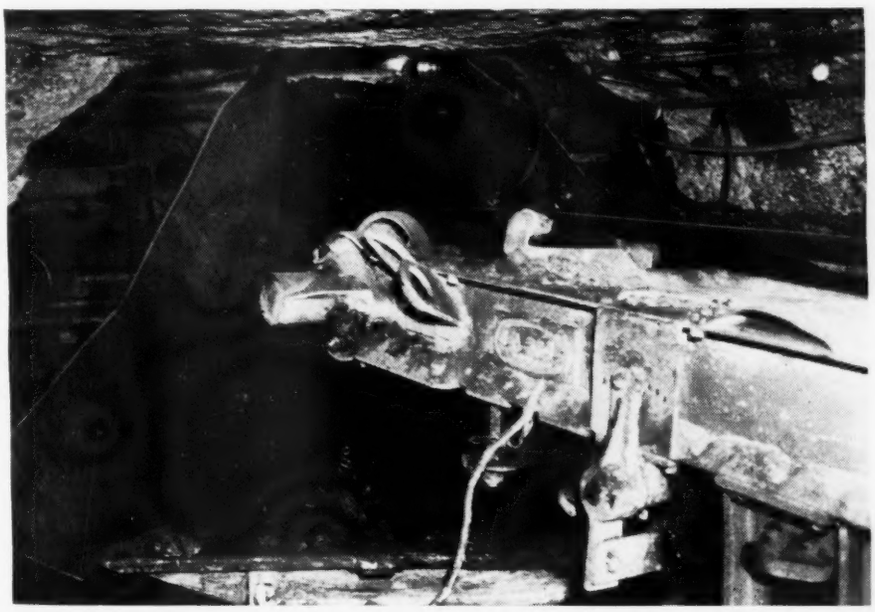
MARKING PERHAPS the first such application in coal mining, a mother belt is being successfully used to pull coal from shuttle cars up a 7-percent grade at the No. 2½ Mine of Standard Coal, Inc., Standardville, Utah. The belt installation



LOADER AND SHUTTLE CAR IN ACTION. The picture was taken from beside the safety jack kept in each place.

up 7-Percent Grade at Standard

went in as part of a complete mechanical-mining program, using loaders and shuttle cars, which has resulted in a substantial increase in productivity, with more expected in the future. An unusual feature of the belt installation is successful operation in a territory where a lower seam has been mined and caved. L. E. Adams heads the company and its affiliates—Spring Canyon and Royal. C. Arthur Carlson is general superintendent. Ray Woodward is general mine foreman at Standard, with Jack Southworth and Harry Latturner as assistants. W. D. Wilson is outside foreman.



SHUTTLE CAR (opposite page) discharging over end of chain conveyor feeding onto belt. In the illustration just above the belt is shown discharging into the elevating conveyor that transfers the coal to the mine cars.

Present operations at Standard are in the No. 2½ seam, about 10 ft. over the 44-in. No. 2, which in turn is about 40 ft. over the 8-to-10-ft.-thick No. 1 seam previously mined and caved. Thickness of the No. 2½ coal averages 6 ft. It dips an average of 9.8 percent North 25 deg. East. It is reached through a main rock tunnel to the No. 1 seam, from which a second tunnel intersects the No. 2 and 2½ beds. Over the No. 2½ seam is about 3½ ft. of shale, which makes a good top, followed by sandstone. A similar shale underlies the seam.

Production at Standard comes from two mechanical-mining units. Aside from the belt, each consists of one Joy 14BU loading machine, two 5SC 5-ton cable-reel shuttle cars, two Chicago Pneumatic Type 574 post drills, using "Coalmaster" augers, heads and bits, one Sullivan 7-B shortwall with 7½-ft. bar (Bowdil chain and bits), one Joy T-1 truck for the shortwall, one Joy T-1 truck for the drilling equipment, one Joy elevator and a M-S-A "Bantam" rock-dust distributor. Timbers and other supplies are handled by the shuttle

DRILLING a room face with post-mounted unit; safety jack at the right. Sprinkling by hose is done during all operations with water piped to the section.

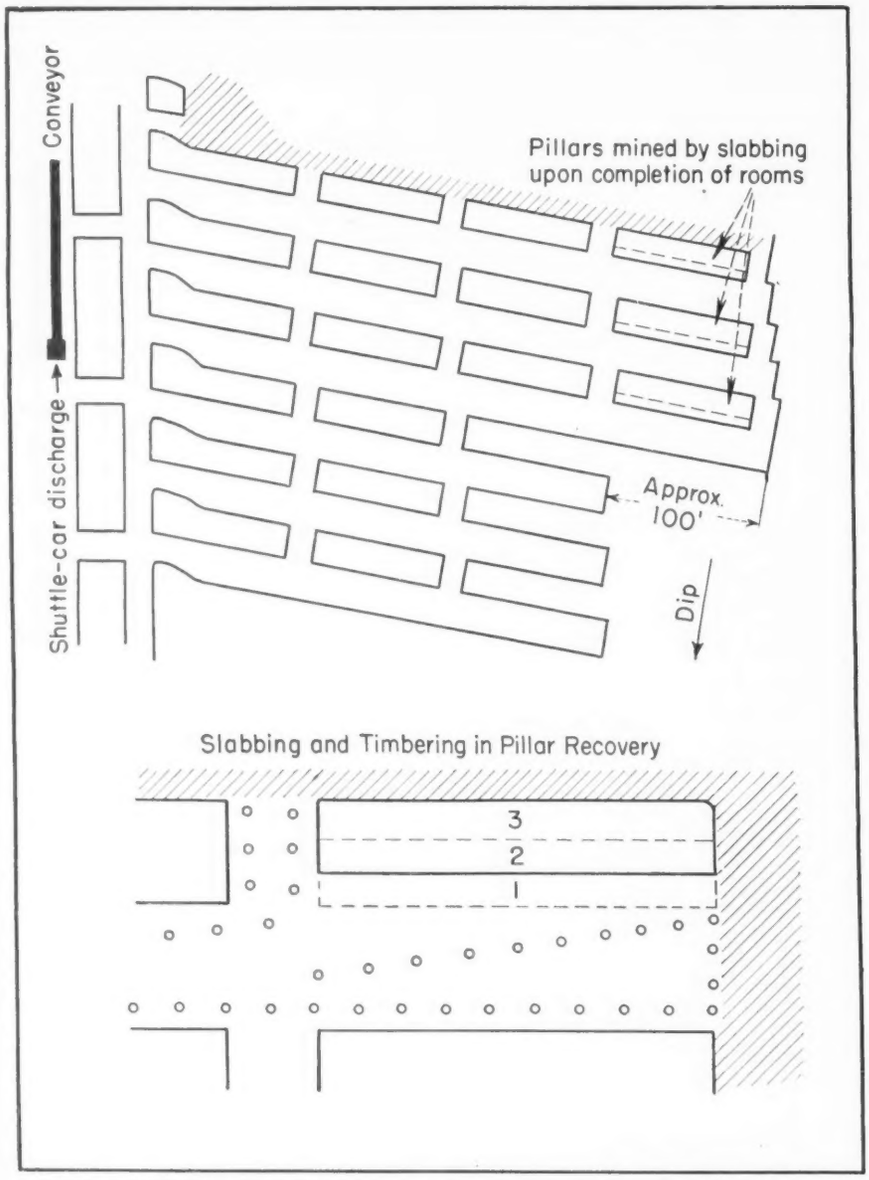


FIG. 1—SIX-ROOM MINING plan and method of recovering pillars by slabbing.

cars, which run to the carloading station to pick them up.

In the case of one unit, as indicated, the face equipment is supplemented by a 30-in. Ladel belt conveyor. The original length was 1,000 ft. and a 35-hp. motor was installed. Equipment has been received to extend the unit to 1,500 ft., at which time a 50-hp. motor will be used. The belt (Republic and U. S. Rubber) is four-ply. Pending lengthening of the belt, its reach was extended by using three chain conveyors in tandem, the shuttle cars discharging over the tail end of the lower unit. With the lengthening of the belt, making it possible to discontinue use of the chain conveyors, plans were under way at the time this article was prepared to develop and install special equipment to receive coal and transfer it to the belt, which operates at 400 f.p.m., or to provide for discharging the cars directly to the belt.

Operation with the belt started Dec. 16, 1945. It was selected because the management felt it offered the best solution to the problem of pulling the coal up the hill in the territory where it is now operating. It is installed slightly off the full dip of the seam, reducing the average grade to 7 percent, compared to the full-seam dip of 9.8 percent. Later, it is planned to use the belt on the strike, driving rooms up and down the pitch, meaning that the shuttle cars will operate loaded up to the pitch from the dip places. In its present location the belt and auxiliary chain equipment is recovering coal down the dip to the property line—a distance of about 2,000 ft. from the entry.

Lower Seam Mined

Using the belt to pull the coal uphill to the elevator for transfer to the mine cars, the present section is being recovered by mining rooms and pillars on one side on the way down and on the other side on the way up. The second stage, working back up the pitch, had been reached when this article was prepared. As stated, the No. 1 coal below has been mined out and caved over at least part of the present belt territory. Apparently, however, the No. 1 seam had been wall caved, because subsidence has occurred in only a few spots and has been rather slight. It has been accompanied occasionally by small cracks. Cover over the No. 2½ seam in the belt territory ranges from 1,300 to 1,600 ft. On the basis of experience between Dec. 16, 1945, and June 1, 1947, including pillar robbing down

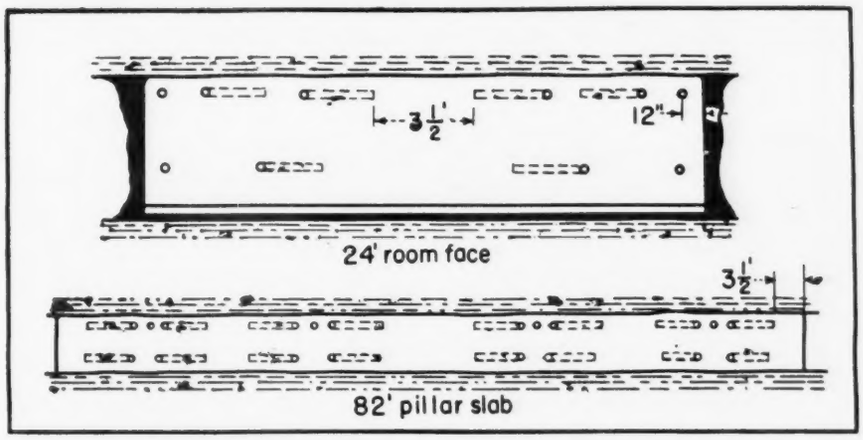
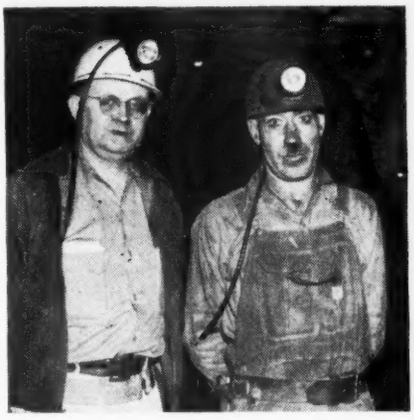


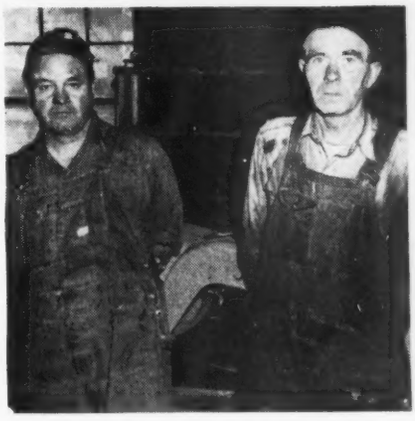
FIG. 2—USUAL DRILLING patterns for room faces and pillar slabs.

Ray Woodward, general mine foreman.



C. Arthur Carlson (left), general superintendent, with Elijah Gentury, face boss.

L. L. Arnett (left), Utah state mine inspector, and L. P. Berenson, face boss.



W. D. Wilson (left), outside foreman, and T. T. Reese, master mechanic.

nearly all of one side of the belt (nearly 2,000 ft.), there is little indication that trouble of any moment will be encountered in the remaining life of the section—about 2½ years. In that period, some rooms longer than usual will be worked returning up the hill to reach the property line on that side.

Standard room depth is 400 ft. Rooms are driven 24 ft. wide on 50-ft. centers. Neck width is 14 ft. Rooms are worked and pillars are recovered in blocks of six—on one side, as stated, going down the dip and on the other side coming back. Where possible, the shuttle-car discharge station is made midway of the six rooms on the belt heading. In other words, that is the location of the lower end of the chain conveyor. Including crosscuts and other incidental openings, six rooms provide about 12 working places.

In mining a block of six rooms, three are kept about 100 ft., or one crosscut-center distance, ahead of the other three, as shown diagrammatically in Fig. 1. Thus, mining normally is a combination of pillar and solid work, three new places being started as soon as the preceding three are down to within about 100 ft. of the heading. Crosscuts 18 ft. wide are driven between rooms, making the pillars approximately 82 ft. long and 21 ft., or three cuts, thick. Pillars are mined by slabbing them the full length, as shown in the second part of Fig. 1. As the places are driven up, posts are set on each side. To get at the first slab on a pillar, the posts, removed one by one to permit cutting, are reset, with those on the outside about the center of the room and the remainder (Fig. 1) angled toward the inby end of the pillar. As each succeeding cut is mined, a parallel row of posts is set. Occasionally, under special circumstances, a pillar may be mined by pocketing through the end, leaving a fender for final recovery.

Falls Average 35 Tons

In solid work (headings, rooms and crosscuts) the average fall of coal is 35 tons. A room face 24 ft. wide normally is shot with ten holes each loaded with 1½ lb. of 1¼x8-in. Hercules Coal Powder No. 2 sheathed explosive. Six holes are drilled in the top and four in the bottom, about as shown in Fig. 2. Two drill set-ups are made. Extra protection during cutting, drilling, loading and other operations is provided by safety roof jacks. The entire section is piped for water and sprinkling with hoses is done throughout all operations, including loading. An 80-ft. pillar slab generally is shot with 20 holes, about as shown in the second part of Fig. 2.

The second production unit at Standard is identical except that it does not include a belt. On the belt unit the standard crew is as follows: Joy operator, helper, faceman, machineman, helper, two drillers, shotfirer, two shuttle-car drivers, chain-conveyor operator, belt operator, car trimmer, clean-up man, mechanic and face boss; total, 16.

Since the coal is very hard and tough, cutting and drilling are the bottlenecks. A further difficulty has been getting full crews to come out every shift. In spite of these handicaps, however, average output from the belt unit was 333 tons per machine-shift in May, 1947. Output per man per shift—all men on the mine payroll—was 9.5 tons in May, compared to 6.37 a year previously. Over the same period, output per man underground increased from 8.83 to 13.07 tons per shift.

STRIP FARMING: VERSATILE CROP PRODUCER

CATTLE graze on spoil banks among cottonwood and locust trees in early morning, then move out into open spaces.

HAY sown on 400 acres yields two cuttings per season and feeds the farm's cattle during the winter.

PEACHES are harvested from this orchard, enriched by upturned minerals in partly leveled spoil banks.

HOGS grow fat on Chain-O-Lakes farm, where 120 were produced last year. Stock is 10 Berkshire brood sows.

WALNUT trees planted from seed 11 years ago have grown up to 15 ft. and have borne for over eight years.

VINEYARDS bearing Concord, Delaware and other kinds of grapes are inspected by Paul Phelps, farm manager.

WHITEFACE HEREFORDS drink water from the pits and graze on spoil banks planted to sweet clover.

Strip Farming for Profit

Scientific Farming Converts Marginal Non-Coal-Bearing Lands Into Profitable Crop Producers—Reclaimed Strip-Mining Spoils Found Excellent for Cattle Grazing, Honey Production, Fruit and Tree Growing

By F. J. FORESMAN
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THE UTILIZATION and development of land acquired through strip mining of coal is a program the Pittsburg & Midway Coal Mining Co., Pittsburg, Kan., has been following successfully for many years. The company's farming program can be divided into two parts: (1) improving and administering tracts of farm land that are adjacent to mining operations but do not contain workable coal; and (2) utilization and development of the mined land through a long-range reclamation program.

The entire project is under the direction of George E. Nettels, vice president in charge of operations, and Paul Phelps, farms manager. Under their supervision a variety of farming and reclamation activities is carried on over a total of 17,065 acres of land.

The entire acreage not mined is utilized for growing wheat, corn, oats, soybeans, sweet clover, grain sorghums, prairie hay and pasture. The total acreage is made up of many tracts varying in size from as small as 50 to as large as 600 acres. Even the smallest tracts are cultivated or used as pasture or hay land. The land is farmed on a share-crop basis by 73 different tenant farmers under the guidance and supervision of the company's farm department. The company acquired a large portion of the unmined land at the time coal lands were purchased, and farmers who own adjacent farms have extended their acreage by working the company's nearby land on a share-crop basis, thus benefiting from the company's interest in developing the unmined land. Many farmers in the vicinity work several smaller tracts in addition to their regular farm. A large number of the tracts are sizeable farms and are worked as such without adding smaller tracts as supplementary acreage.

Since most of the land in the district is marginal, adequate fertilizer must be used to obtain good results. An extensive fertilizer program is carried on to build up the soil and increase production. All farmers who work company land are encouraged to use fertilizer by the company's policy of paying half the cost. Cooperation is 100 percent as a result of proved increased production. Limestone, ammonium nitrate and 2-12-6 are the fertilizers most commonly used.

As a result of the fertilizer program, an average of 20 bushels of wheat per acre will be harvested from company ground this year. The average yield for the district, according to the AAA, is 12 bushels per acre. It has been found that ammonium nitrate also raises the protein content of wheat, which is an aid in obtaining top market prices. Many oat fields on company ground make an average yield of 40 bushels per acre in comparison with the district average of 25.

Fertilizer Value Proven

Fertilizer has been used with good results on pasture land and native meadows. Since there is no shortage of potash and phosphate in these lands, only nitrate in the form of ammonium nitrate is used. As an experiment, a large acreage of meadow land was treated in strips for a check comparison. The fertilized strips were deeper green in color and made a more luxuriant growth. The grass grew so rank in the treated strips that the weeds were choked out completely. Another check comparison on pasture land showed that cattle grazed the

FUTURE FARMERS get a lesson in cattle-raising from H. Taylor, Kansas State College agricultural expert.

SWEET CLOVER flourishes head-high on spoil banks. Seed is grown close by on unmined land.

strips where nitrate was used in preference to the untreated strips.

As a result of the experiments, all the company meadows were fertilized with 125 lb. of ammonium nitrate per acre. The first cutting of hay was made June 15, which is the earliest date on record in the district. Ordinarily, district hay operations begin around Aug. 1 to 10. A yield of 1¼ tons per acre was obtained from the first cutting, and it is estimated a second cutting later in the summer will make the same yield. That means that 2½ tons of hay per acre will be obtained this year. Before the meadows were fertilized, only one cutting a year was made, with a yield of only 1 ton per acre. Cost of fertilizer was $3.25 per acre, and the realization in increased yield at current market prices will amount to $33 per acre. All hay cut on company land is used as supplementary winter feed for the company's large herd of Hereford cattle. None of the crop is sold unless there is a carry-over into the spring.

To increase production, the latest scientific farming methods are followed. Close contact is maintained with county farm bureaus and agricultural departments of state universities. Crops are grown that are best adapted to the region. For example, Pawnee, Kawvale and Fulohio are the principal kinds of wheat grown because they have been developed to resist drought and the Hessian fly and because their stem strength is especially adapted for combining.

Winter oats had never been grown successfully in the district until the company, through its contact with the state universities, learned of a variety of oats developed by the University of Missouri especially for winter growing. The experimental work with the new kind of oats was carried on by L. Miller, Golden City, Mo., and seed obtained from him was planted in the fall of 1946. Results of the trial planting have been unusually successful. Not only did the tract provide adequate pasture to pay for the seed, labor and fertilizer, but, in addition, will return a yield of 50 bushels to the acre when harvested. The entire crop will be used for seed and more bids have been received for seed from tenant farmers than can possibly be filled this year.

Small Grains Replace Corn

Experience has proven corn to be a losing crop in the region. It does not fully mature until the latter part of July or early August, and its growth generally is stunted before maturity by drought and the hot winds that normally prevail in the area. As a result, the acreage planted to corn is being decreased. To replace corn, the company recommends small grains, such as wheat and oats, and such crops as soybeans and grain sorghums.

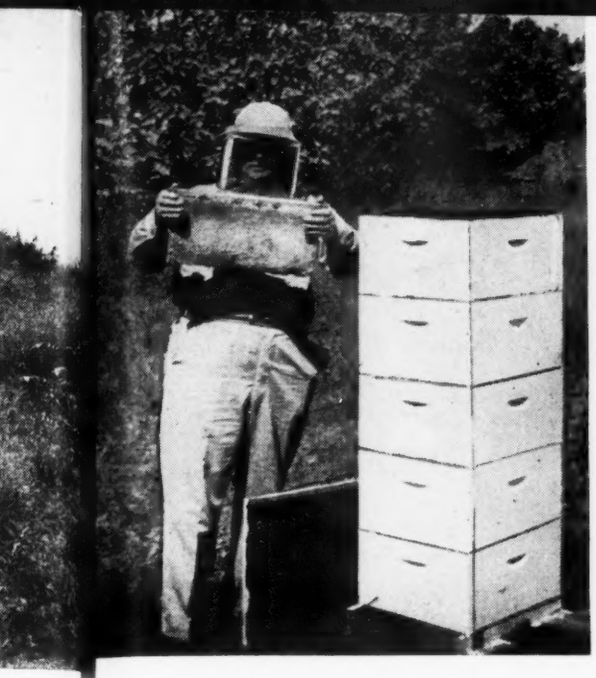
This season there will be harvested from company ground 2,260 acres of wheat, 860 acres of oats, 1,100 acres of corn, 800 acres of soybeans, 177 acres of tame grasses for seed and 1,300 acres of grain sorghums. Total area in cultivation is 6,500 acres. Two cuttings of hay will be made on 400 acres of native-grass meadows. Also included in the first part of the company's farm program is 2,100 acres of pasture land.

The second part of Pittsburg & Midway's farm program is reclamation work. The company has been a pioneer in this field and has made much progress in the utilization and development of mined-out areas.

After strip-mining operations are completed, the land to be used for grazing is allowed to lie fallow for three years to let natural erosion and leveling take place. Then reclamation work begins. Pasture in the form of red top, lespedeza, red clover, brome grass, rye grass and sweet clover is sown over all the spoil banks. A good stand is obtained the first year and after the third year the growth is such that it will reseed itself. All the grasses make a vigorous growth, especially the sweet clover, which grows taller than a 6-ft. man.

No fertilizer is required on the spoil banks. Strip-mining operations make available all the natural elements which previously had been used up in the top soil. A hard-pan of hard clay underlies the top soil in the region, and turning over the ground not only makes the natural elements available but also makes available more moisture through the wick action of the loose soil. The hard-pan limits undisturbed land to surface moisture only.

Most of the seed used in reclamation work is grown on company ground. This year, seed will be har-



BEEKEEPER George Richardson robbed hives of over 800 lb. of honey in July.

vested from 87 acres of sweet clover and 90 acres of other pasture crops, such as red top, lespedeza, red clover, brome grass and rye grass. It is estimated that the sweet-clover tract will yield 200 lb. of seed per acre.

Most of the spoil banks used for grazing are not leveled except by natural erosion. As an experimental project, the tops have been knocked off 500 acres of spoil banks by a bulldozer making one round on each dump. The purpose of the partial leveling is to make it easier for the cattle to get around. The area will be sown to pasture and stocked with cattle from the company's experimental farm.

Reclamation work centers upon the company's experimental "Chain-O-Lakes" farm, so called because of seven small artificial lakes scattered over the acreage. The farm covers 1,040 acres of land, 640 acres of which are spoil banks. A herd of 242 Hereford cattle is kept on the place, with the former spoil banks as the principal pasture. It is planned to build the herd up to 300 head of breeding stock. All bulls kept in the herd are pure-bred and registered. Many of the cows also are registered, but no attempt is made to have all registered stock. However, good-grade cattle are kept for breeding stock and all of the herd are pure-bred.

In connection with the Chain-O-Lakes farm are three other grazing sections of 480, 340 and 640 acres respectively. The first two sections are reclaimed spoil banks and the third is a farm used for both grazing and raising of winter feed. Each spring, the yearlings and two-year-olds are placed on these projects.

The entire region in which the reclamation projects are located is semi-arid and farmers usually have difficulty in obtaining adequate water for stock in midsummer. However, spoil banks reclaimed for pasture land present no such problem because plenty of water is available for stock in the pits, which are kept fresh by underground seepage.

Where the grazing acreage consists of both spoil banks and undisturbed land, experience has shown that cattle graze the pasture grown on spoil banks in preference to that grown on undisturbed land and are in better condition than cattle grazed on other pasture.

A silo of 600-tons capacity is located on the Chain-O-Lakes farm and is filled with grain sorghums grown on company ground for winter feeding. A 400-ton silo will be built this fall on one of the other projects to provide additional feed. The silage is supplemented with prairie hay and grain raised on company farms. All the company's share of oats, corn and ensilage crops is used as feed.

Ten registered Berkshire brood sows are kept at Chain-O-Lakes farm. Last year's production amounted to 120 hogs.

Tree Growth Rapid

Spoil banks not developed as pasture are utilized for reforestation. Thousands of walnut, locust, pine, wild-cherry, ash, burr-oak, sycamore, pecan and osage-orange seedlings have been planted over 700 acres of stripped land. Rapid growth takes place because the loose soil is conducive to stronger roots and makes more moisture available. Growth also is stimulated by the natural elements made available when the hard-pan lying beneath the top soil is broken.

Walnut trees planted from seed eleven years ago have attained a growth of from 12 to 15 ft. and have been bearing walnuts of unusual size and flavor for over eight years. Locust trees make an especially rapid growth and, as a result of straightness and moisture-resistant characteristics, offer good possibilities as potential fence posts. The average rate of growth for all seedlings is almost double the normal rate of growth on undisturbed land.

Good results have been obtained from 46 acres in orchard and vineyard. Peach, apple, pear, cherry and apricot trees have returned good yields, as have Concord, Cacao, Delaware, Portland, Zinfedal and many other varieties of grapes. All the fruit has a flavor distinctly different from fruit grown on undisturbed land. Horticulturists advance the theory that elements made available when the soil was turned over are responsible for the improved flavor.

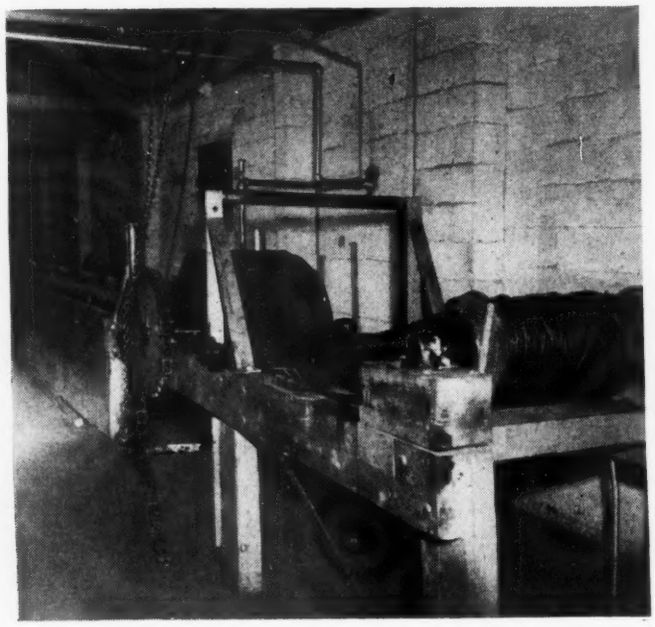
Sweet clover grown on the spoil banks offers a good opportunity for the production of honey. The company has 25 hives of bees located near the spoil banks on the Chain-O-Lakes farm. Early in July, over 800 lb. of honey was taken from the hives. The honey is extracted from the comb and the frames of empty comb are placed back in the hives to be refilled. This procedure increases the quantity of honey produced because the bees do not have to build new comb. Additional hives will be placed in the area as soon as materials and bees are available.

Future Possibilities Studied

For the past two years, two foresters from the Central States' Forest Experiment Station, Columbus, Ohio, have been stationed in Pittsburg, making an extensive survey of the area with respect to reclamation possibilities. Utilizing the results of the study, trial plantings were made in March under the direction of Nelson F. Rogers, forester in charge, Forest Experiment sub-station, Pittsburg. Thirty-five thousand seeds and seedlings were planted in three different sections of the Pittsburg district, 10,000 on Pittsburg & Midway land. Records will be kept concerning stand, rate of growth, etc.

Records kept on all farm activities by Pittsburg & Midway prove that modern scientific farming methods and good management pay dividends in increased production and realization and that reclamation work offers great possibilities. The grazing projects centered upon the company's experimental farm have shown good results and even better results are expected as the experiment progresses. The reforestation projects have not yet had time to pay dividends but silviculturists and other experts interested in reclamation are enthusiastic about the possibilities. They feel the land from which coal has been taken can be made to return more profit per acre over a period of time through reforestation or grazing than it would have produced in the same period from growing crops.

CENTRAL BELT-MAINTENANCE shop and warehouse for Leckie mines includes two tables for repairing and drying.



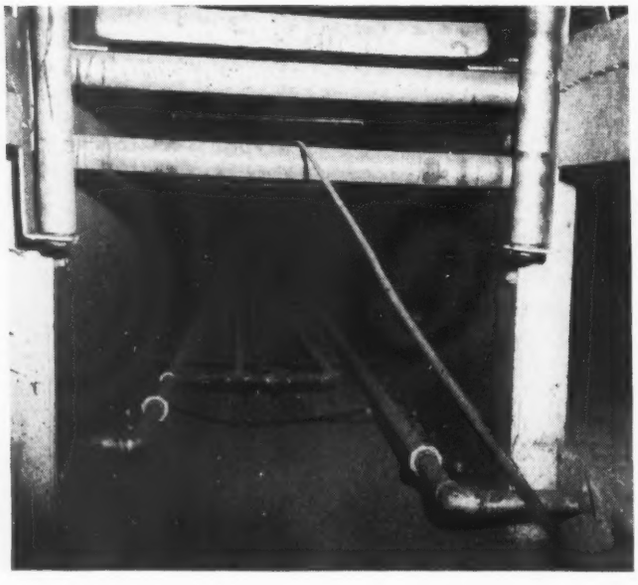
PART OF THIS 300-ft. of belt is on the table and the remainder, already repaired, is on the power-driven reel.

Shop Aids Belt Maintenance

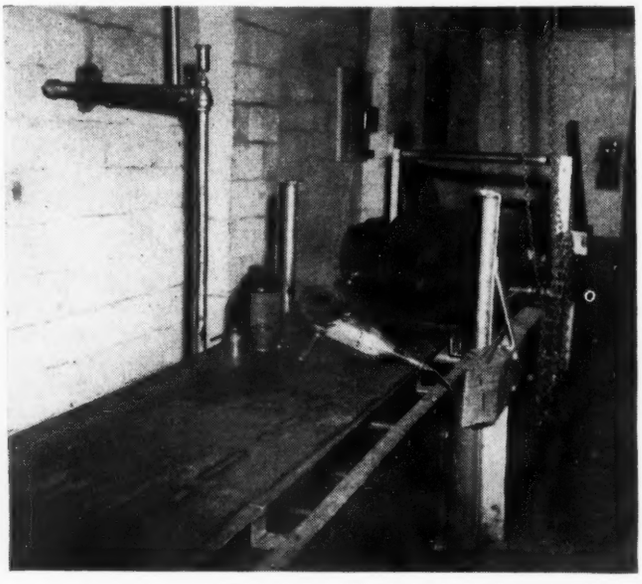
With Repairing and Drying Tables 150 Ft. Long, New Belt-Maintenance Shop at Panther No. 5 Mine Has Resulted in a Substantial Saving—Facilities Are Such That a Complete Belt Could Be Built

"BUILD and equip a shop for proper maintenance of the belting" was the first suggestion of a general superintendent with long experience in conveyor mining in the course of a recent interview on the selection and installation of underground belt conveyors. A recently completed installation at Panther No. 5 mine of the Panther Coal Co., Marybill, Nicholas County, W. Va., stands out as one of the best of these shops. Size of the building—28 ft. wide by 274 ft. long—indicates the importance of this phase of maintenance. Top officials of the company are convinced that this belt shop is a very profitable investment.

Panther No. 5, under H. C. Weaver, superintendent, is one of eight mines operated by seven companies

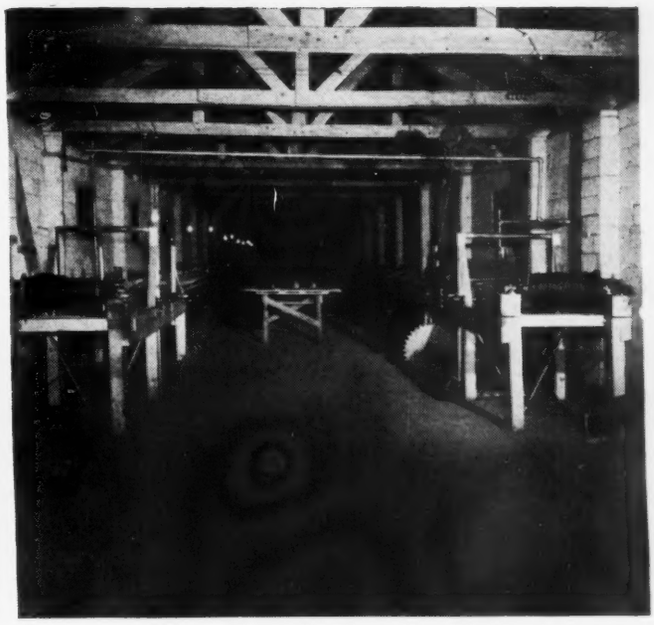


STEAM-HEATING PIPES are mounted over aluminum reflectors under the tables. The wire rope is attached to the end of a belt.



A SUCCESSION of damaged spots undergoing repairs. Buffing is done with the portable electric tool carrying the wire brush.

REAR ENDS of the two 150-ft. belt-drying and repair tables at the Panther No. 5 mine, Panther Coal Co., Marybill, W. Va.



FRONT, or drive, ends of the drying and repair tables, showing the power-driven reels for positioning the belts.

of the Leckie interests, with headquarters at Columbus, Ohio. Five of those mines use underground belts and it is likely that they will be installed in some of the others. Total production of the group, operating in southern West Virginia, eastern Kentucky and Virginia, is 2,225,000 tons per year. W. S. Leckie, Columbus, is president, and Wm. H. Leckie, Bluefield, W. Va., is general manager.

Tables Handle 300-Ft. Belts

The new belt-maintenance building at Panther No. 5 is 12 ft. high at the eaves. It is built of concrete blocks, has glass-brick windows and a concrete floor, and is roofed with coated corrugated metal. It serves not only for repairing belts but also as a receiving warehouse for all belts purchased for mines of the Leckie interests. An 80-ft. section at one end of the building serves as a storeroom and part is being used temporarily as a shop for the local mine. The belt repair room proper is 28 x 194 ft. This great length is required so that half of a 300-ft. length of belting can be stretched out on top of a repair bench while the other half is doubled back under the bench for drying. Two of these 150-ft. tables are provided, one on each side, with a 3-ft. space along each wall to provide a convenient alleyway for the workmen.

The bench top is sheet steel 38 in. wide to accommodate belts up to 36 in. At the rear end of each bench is a tail pulley and underneath are flat idlers spaced 10 ft. apart. The sides of the benches are housed with steel to confine heat, which is furnished by steam pipes installed along the bottom. To reflect the heat upward against the belt, sheets of bright corrugated aluminum are installed on the floor under the coils.

The front end of each bench is equipped with a motor-driven belt reel and a motor-driven drum with 300 ft. of wire rope. This drum is used to pull a belt off the reel onto the top of the table and, if necessary, on around underneath. Belts are lifted to the reel stack with chain blocks.

While most of the repair work consists of applying new coatings to worn spots and coating the edges of worn belts, a great deal of new canvas ply also is installed. Worn or rotted plies at damaged spots are replaced and rips are repaired even if a belt is split from end to end. As a matter of fact, a complete new belt could be built up on the repair tables.

Canvas Buffing Eliminated

Originally, the canvas ply was purchased already treated with cement. This, however, necessitated extensive buffing before application. Now, raw duck is purchased and treated with cement or compound just before its application to a repair job, thus eliminating buffing. New edges are put onto belts by applying the synthetic compound with a putty knife and then smoothing with an edging tool. Old splices are cut off and the new ends are sealed.

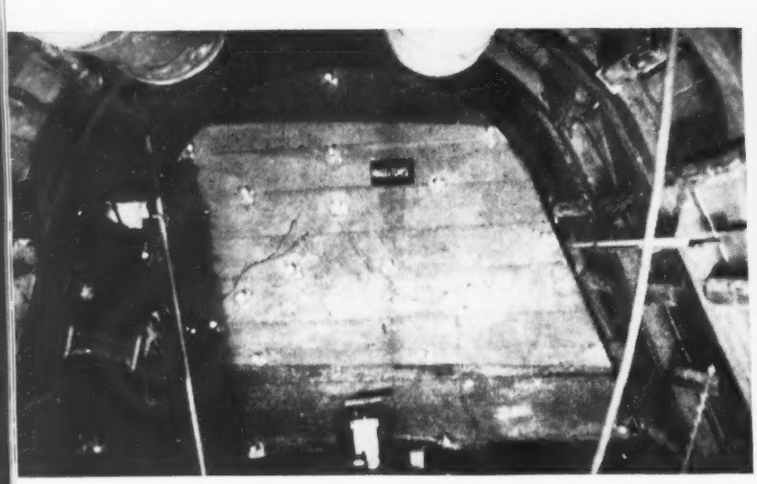
The new synthetic cements and compounds are self-curing and need not be heat vulcanized. Since they have a tendency to harden in shipping containers if kept very long, especially in summer heat, a concrete-lined pit was built in the floor in one corner of the shop for storage at a lower and more uniform temperature.

In the illustrations—made before the belt shop was finished—a string of incandescent lamps shows over one bench. This temporary lighting will be replaced with fluorescent lamps and, to hold the number to a minimum consistent with good illumination, they will be mounted on trolleys so they can be moved through a certain range along the table to provide better conditions for work on belts.

Lighting to Be Movable

Some of the belts are very wet when brought into the belt shop. To help get rid of the moisture, a good-sized fan at one end of the building keeps the air circulating. The steam-heating boiler, equipped with automatic stoker, is in a small building separate from the belt house.

Large savings are possible by proper repairing of gouges, worn edges and rips in belts to minimize further wear and keep moisture out of the plies, thus securing the full belt life. For proper bonding of the compound to the plies it is highly important that a belt be thoroughly dried before any attempt at repairs is made.



HOW SHOTS ARE WIRED is shown in the face of this "entry." The electric lights flash to show the sequence of shots.

MINER STUDENTS have the advantage of life-sized equipment and facilities in learning the proper ways to do the jobs.

Recruiting and Training Men

How One Belgian Coal Producer Goes About Solving a Problem Becoming More Prominent in the United States —More and Better Miners and Managers the Objectives in This Organization's Training Work

By JEROME C. WHITE
Ebensburg, Pa.

BELGIUM is an intensely industrial country whose economic foundation is coal. Necessary coal production depends upon adequate manpower. Through the operation of economic and social forces, the available manpower for coal mining began to decrease about 1930.

Social legislation, such as decreasing the eligible pension age from 60 to 55 years and increasing the pensioner's annual income, op-

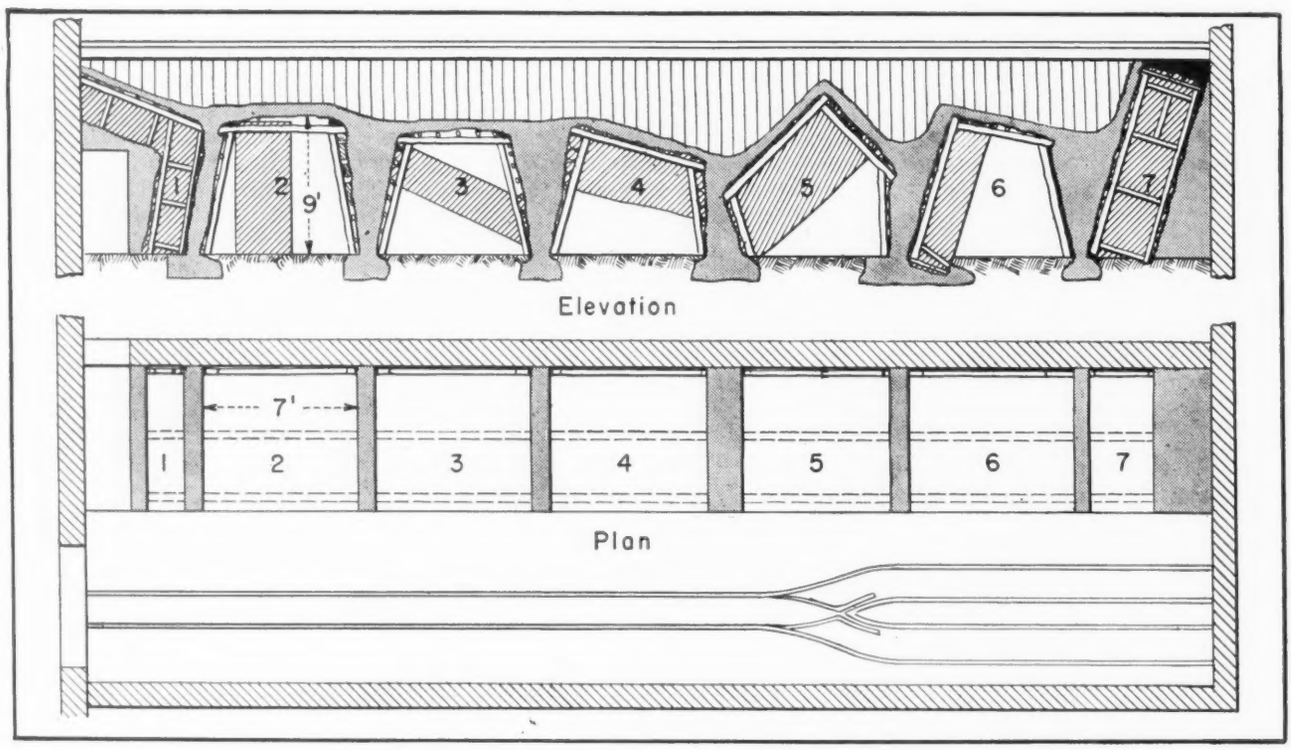
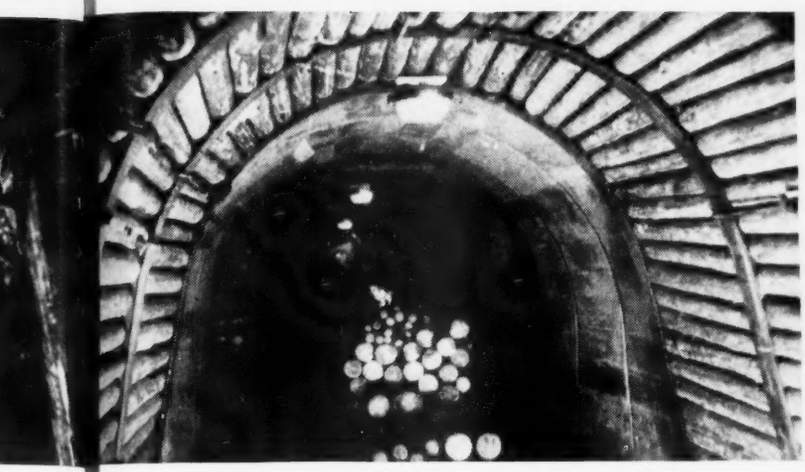
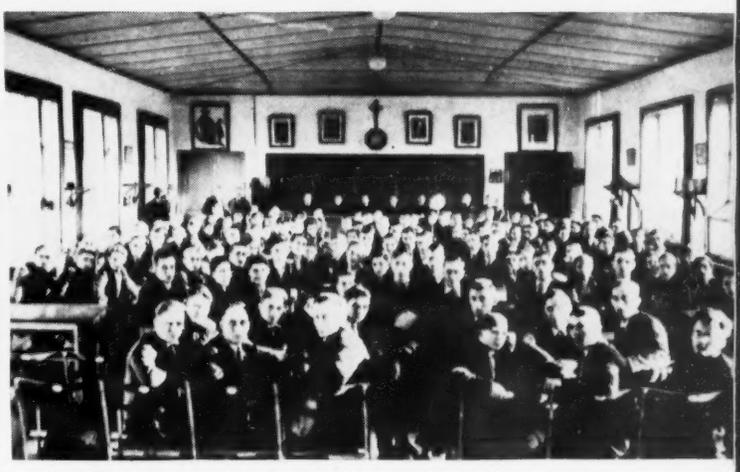


FIG. 1—STUDENTS WORK OUT PROBLEMS on a life-sized scale, with actual materials and under the supervision of qualified officials in this section of the hall of timbering. While not all are shown, thirteen working places are available. The shaded portions within the timber sets show the positions of the coal veins.



TWO TYPES OF ROOF SUPPORT shown along this entry use steel sets, but one employs round lagging and the other plank.



WHEN LECTURES and conferences are necessary, a well-equipped hall insures the interest of the students in the job.

At a Belgian Coal Operation

erated to reduce the number of skilled miners at work. The growth of manufacturing industries within the coal districts made the recruitment of young men for the mines increasingly difficult. These developments, with the drift to other trades and professions, practically stopped the movement of the young men of the district to the mines.

The experience of one large company in the Borinage—the Charbonnages D'Hornu et Wasmes, at Wasmes, near Mons—is typical of the mines in the South Basin. In the two years 1935 and 1936, the payroll separations totalled 369, of whom 199 became eligible for pensions, 20 died and 150 quit to take up other trades in other industries. During the same two years, 104 new employees were hired, making the net loss 265 men for that period alone.

It became obvious that if coal production was to be maintained, this outward flow of manpower must not only be stopped, but reversed. Gerald Delarge, general manager, conceived a program designed to do this. With M. Barbier, chief engineer, he began a vocational training school in 1936, whose primary purposes were: (1) to recruit and train young men and (2) to assure qualified workers for

VERTICAL WORKING PLACES are encountered underground and so one is included in the school facilities.

REAL MINING MACHINES are available to the students in the mechanical hall, where equipment from the repair shops is brought for testing. A miniature surface-plant track system in the hall is used for study of car movements.

the company's mines. M. Delarge and his staff designed the system to make a career in coal mining more interesting and remunerative to young men.

The final development provides: (1) a training school for apprentices entering the coal industry; (2) education and training facilities for employees to become more skilled in their respective jobs; (3) an opportunity for ambitious workmen to become mine officials; (4) a method of preparing properly qualified students to enter professional schools as candidates for engineering degrees; and (5) a show place available to the general public to counteract the popular impression that coal mines are terrible places in which to work.

Model Mine Lends Interest

The initial objective—to recruit workers for the mines—required that mining work be made interesting. A model mine was built on the surface to natural scale and equipped with the identical materials and equipment used underground, including forced ventilation and artificial lighting. Within are contained sections on the several coal-bed inclinations, from horizontal to vertical, to be found within the company's mines. This small mine gives a realistic impression of being underground. It is open to the public.

A working section is completely equipped. The main entry, and its parallel airway some 600 ft. away, contain the necessary tools and machinery. The main entry leading to the face is divided into sections showing the types of roof supports used: ordinary, angle-braced and reinforced timbering; Holland style; steel supports (ordinary and Moll); and concrete and brick supports. Facilities for the control of ventilation, such as brick stoppings and doors, as well as auxiliary ventilators, are included.

Three working faces are available. One is equipped with shaking conveyors for coal coming down the pitch of the vein, a second is fitted with a chain, or scraper, conveyor for raising coal up the pitch, and a third is equipped with a rubber belt conveyor. The faces are arranged so that the conveyor systems form a closed circuit.

Within the "working" district is a passageway 600 ft. long connecting the main entry and the aircourse. Along this passageway (crosscut or "bouveau"), all the current styles or types of permanent and semi-permanent roof supports are permanently installed and serve as examples of model timbering. Adjacent to this passageway is a longwall working face wherein the correct methods of mining are shown, as well as the control of ventilation.

Also within this "working" district are sections devoted to the methods of mining for the several pitches of the coal seam from the horizontal to a stairway up the vertical pitch. One of the sections included shows the method of working a "valley" when the coal vein takes a steep drop and rises again. Rope, hoists, cars and safety devices are here.

Tremendous ground pressures in Belgian coal mines present a special timbering problem, the solution of which is a particular objective of this school. To accomplish this objective effectively, an additional timbering district is provided where arrangements are made to actually set and reset the timbering.

The timbering district is shown in Fig. 1. It is 54 ft. long by 25 ft. wide. Stalls are provided to the right and left of the center aisle, which represents an advancing entry. The faces in the stalls represent the coal seams on inclinations from horizontal to vertical.

13 Places for Timbering

The stalls representing working places are 7 ft. wide by 9 ft. deep and permit timbering problems to be worked out on a natural scale. There are 13 stalls or "working places" available, but only those required by the problems the students are working on at any given time are used. Here the students, individually and in groups, work out their practical problems. The work is supervised by foremen, simulating as nearly as possible required underground conditions.

The face of the entry has been arranged to demonstrate the methods used in delayed blasting. The sequence of the blasts is shown by electric lights. Complete blasting and testing equipment is available.

A mechanical hall is an essential part of the training facilities. It includes electrical facilities, compressors and compressed-air equipment and machinery such as pumps, hoists, rotary and piston-type engines, auxiliary ventilators, coal picks, cutting machines and first-aid equipment.

Testing and measuring instruments and facilities are provided. Machinery is brought to the hall to be tested for efficiency in compressed air and electricity consumption. The equipment in this room is used by the engineers in charge of mechanical maintenance for testing and also by the students to work out their practical and theoretical problems.

The surface-plant track system installed in the hall in miniature is used frequently to study the efficiency of car movements into preparation plants and yards and to work out new problems in surface handling.

Lecture Hall Seats 120

A lecture hall with a capacity of 120 students is provided and is equipped with the facilities necessary for lectures and conferences. The equipment includes all types of electric and flame safety lamps, gas-testing devices, coal-analysis laboratories, and such other equipment as is ordinarily used in colliery management.

The surface layout of the buildings is such that the lecture hall and mechanical room are close together and connected by a stairway to the model mine.

The Societe Anonyme du Charbonnages D'Hornu et Wasmes operates two divisions, Hornu and Wasmes, each of relatively equal importance. The divisions have separate apprentice classes, under the charge of the chief porions and under the general supervision of chiefs of staff departments. The chief porions in Belgium correspond to general assistant mine foremen in the United States. Mine foremen in Belgium must be graduate mining engineers.

The same school facilities are used by the two divisions, but on different days. This separation stimulates competition between the students and thus tends to make the course attractive.

To facilitate work control and recording of progress, each student possesses a card showing his name, occupation, age, diplomas or certificates held, if any, place of employment, a monthly statement of his performance and his average daily earnings. The reverse side of this card shows the student's school record. A red-colored diagonal band on the card shows that the holder is a member of the "Theoretical Section," as distinguished from the "Practical Section."

The students are given "work-order" cards which show the practical work to be done, such as tim-

bering working faces, timbering entries, special timbering and timbering according to plans, as well as special and difficult work. The "work-order" cards are issued to student groups according to their respective capacities. The better groups are not retarded in their progress by others who may be slower. When the assigned work, as shown on the "work-order" cards, has been completed, it is graded and recorded with two things in mind: (1) quality of work done in regard to workmanship and safety, and (2) the time required to do the work measured against the allotted time.

The students' cards show: (1) his attendance, (2) rate of progress, (3) professional aptitude, and (4) a check on his performance on the job after school. An examination of the cards also is made to determine the possibilities of improving school methods.

Students who complete their assigned work before the allotted time are free of school. New groups may enter the school at any time without disturbing other groups of students.

Four Courses Offered

The school is organized in four sections: preparatory, practical, theoretical and mechanical-maintenance. In the preparatory section, running a year, the instruction is directed to young men who know little or nothing about the trade or occupation they desire to follow. A substantial number of men who entered this section were miners' apprentices. The course is designed to familiarize the students with the work of the miner. The study program includes a cycle of group conferences covering the work of the miner, the possibilities of the future for the trained workman and the potential value of the school to the student. The conferences are held weekly but are limited to sessions of one-half hour each.

The conferences are followed by visits to the model mine where the students work in small groups under an instructor. These visits include demonstrations of phases touched upon in the lectures and conferences.

Classes in arithmetic, language and methods of personal improvement are held. At the close of the year written and oral examinations are given. The results of these tests determine the course of the student's future work; some going to the "Practical Section" and others to the "Theoretical Section." Those who have been deficient may repeat the first year's work.

The required course in the "Practical Section" takes two years and consists of practical work. The course is conducted by lectures, conferences, demonstrations and actual work in the model mine. The purpose of this section is to turn out workmen qualified for timbering and the maintenance of mechanical equipment, and thoroughly imbued with the safety idea.

Practical Work in Model Mine

The practical work is done in the district of the model mine assigned to timbering. Here the student does full-scale timbering work under the guidance of mine officials. Each working place is large enough to accommodate two sets of roof supports, whether steel or wood. Adequate supplies are delivered to the working place, as would be done underground. There are adequate facilities to accommodate two groups of 20 students each.

The students in the "Theoretical Section" follow the same course as those going into the "Practical Section." However, the conferences and lectures of the "Practical Section" are replaced by lectures and conferences on methods of mining and management of collieries given by the mining engineers of the company. Included in this section are courses devoted to language, mathematics, physics, the topography and geology of the area, and such other studies as will point the student toward his objective.

Coupling treatment of text material with practice makes the material seem less abstract. The presence of the management staff and engineers, with maps and engineering equipment, and the availability of the tools and instruments of management interestingly applied to the problems, maintain the student's interest, as well as developing his powers of observation.

This section requires three years and is graded in three steps. The first year prepares the student for mine examiner (fireboss); second year, for faceboss in charge of a longwall face; third year, for district or section foreman. The chief portion, or chief of section foremen, is chosen from among the section foremen. Eventually, the better students from this section will be sent to the Technical Institute of the Borinage, at Mons, Belgium. After three years of successful work here, they will receive a diploma to qualify them for mine foremen or mine managers.

Integrated into the entire course, but with a special objective, is the course for mechanical-maintenance men. This course was established as a result of an urgent need. The purpose of this course is to educate and train the personnel in charge of mechanical equipment operations and maintenance. The course is one year and is directed especially to underground workmen.

Groups are organized to study the repair and maintenance of compressed-air tools and engines, under the direction of the chief maintenance engineer for compressed-air equipment. Attention is given to studying installations underground, such as compressed-air lines, and to the importance of a good air supply for all engines, especially conveyor drives, with emphasis upon safety measures at the working face.

During the course the instructor and the classes use in turn all the mechanical equipment of the school and cover methods of mining, safety regulations, mining laws, transportation and ventilation. The students will have performed during this time the work of each class of skilled workers normally employed underground.

Talented Given Extra Training

Selected students with special aptitudes in this branch of operations are advanced to the Technical Institute of the Borinage, at Bossu, for an evening course of studies in mechanical and electrical engineering. Upon successful completion of this course they are awarded a diploma certifying their competence to supervise mechanical operations and maintenance.

Accurate appraisal of the results of this training course is difficult. The period from 1936 to the present has been a particularly troublesome one in the coal industry in Belgium. It included a strike in 1936, the uncertainty prior to the war in 1938-39, mobilization from 1936 to 1940, the campaign of 1940 and its effect on working personnel, next the German occupation and, finally, World War II.

However, the apparent results are encouraging and indicate that satisfactory progress has been made in recruiting personnel, reducing labor turnover, increasing the number of workers available for the skilled-labor classifications and increasing the number of men available for supervisory and engineering positions.

British vs. American Coal Mining

EUGENE McAULIFFE . . . "Britain should abandon its further ventures along the road to socialism, want and suffering."

British Coal Situation Highlights Comparative Efficiency —Differences in Physical Conditions a Factor—Political Outlook Another—Cessation of Socialistic Ventures and All-Out Production Essential to Recovery

By EUGENE McAULIFFE

Chairman, Board of Trustees, The Union Pacific Coal Co., Omaha, Neb.

WITH A DEFINITE SHORTAGE of coal for transportation, public service, manufacturing and heating processes now confronting Great Britain, and with the possibility of a repetition of the suffering endured by the British people in the winter of 1946-47, much is being said respecting the fact that the average production per man-shift of the British mine worker is not comparable with the daily output of the American mine worker.

It is axiomatic that no two coal mines are alike, whether compared physically or in output per man-shift, which, after all, represents the most comprehensive method of comparison. The criticism of the British coal operator and mine worker centers around the fact that the American mine produces about 5 1/16 times the weight of coal secured in Great Britain per man-shift worked. The British output is running at 1 ton per man-shift, while our record for all bituminous and lignite mines averages 5.78 tons per man-shift.

The first element in this comparison which the average writer ignores is that Britain uses the long ton (2,240 lb.), while our bituminous-coal figures are based on the short ton (2,000 lb.). Thus, the British ton is 12 percent heavier than ours. We would recommend that Britain hold onto the Tower of London, Westminster Abbey, St. Paul's Cathedral and a thousand more of its traditional landmarks, but that it should adopt the decimal system in its weights and currency.

This difference of 12 percent, however, is but a minor matter. The real handicap that Britain suffers lies in the marked spread in physical conditions, including the removal of much-thinner coal seams and more heavily pitching measures. Much of Britain's coal is taken from a series of coal seams, many of which lie at depths under the surface so far below our maximum present-day depths as to make any real comparison impossible.

In the absence of any British national average, we are compelled to depend upon the drilling records of a new Scottish property where sinking is now under way and which will approximate the average of all British mines. The U. S. Bureau of Mines released in July, 1947, its Mineral Market Report M.M.S. No. 1526, which covers the "Thickness of Bituminous-Coal and Lignite Seams Mined in the United States in 1945." A similar survey was made by the U. S. Bituminous Coal Commission for the year 1920, which checks very closely with the 1947 compilation, from which we abstract the following:

Mine	Tons Coal Mined	Avg. Thickness, Feet	Avg. Tons per Man-Shift
Strip	109,986,865	5.30	15.46
Underground ..	467,630,462	5.40	5.04
All Mines	577,617,327	5.40	5.78

The production of 15.46 tons per man-shift in the 19 percent of the total production stripped, as compared to 5.04 in the underground mines, presents conclusive evidence of the extent to which physical conditions enter into man-shift tonnage.

In June last, we were given the opportunity to review the physical conditions that attach to a mine now under construction in Fife, Scotland—the Rothes colliery, originally planned by the staff of The Fife Coal Co. and which is now being constructed by the National

Coal Board of Great Britain, whose engineers and mining experts approved the plans of the Fife company.

The details of the Rothes colliery were worked up by the Fife company's staff after making an exhaustive inspection of the largest and most-modern collieries in America and on the Continent. Many of the details adopted were, in fact, taken from American and Continental properties. A total of 11 separate seams, ranging from 20 to a maximum of 84 in. in thickness, will be worked through two circular shafts 24 ft. in diameter. None of the seams are of uniform thickness nor are they continuous throughout the property. The area of the available field, 10 square miles or 6,400 acres, with a reserve of workable coal totalling 183,000,000 long tons (204,496,000 short tons) will be mined from 51,618 seam-acres, or approximately 73 percent of the total coal-bearing acreage. The details set forth below will prove informative:

Seam	Acres	Thickness, Seam, Inches	Total Calculated Reserves, Tons
Smithy Top	6,245	20-50	21,857,500
Smithy Lower	6,245	30-60	25,604,500
Little Splint	4,743	22-75	14,229,000
Seven Feet	4,991	32-57	14,973,000
Main	5,874	31-40	16,447,200
Jersey	2,514	20-40	7,793,400
Top Lochgelly	6,439	28-58	25,756,000
Lower Lochgelly	6,439	23-33	16,741,400
Glassee	646	20-30	1,679,600
Five Feet	6,439	28-84	35,414,500
Dunfermline Splint	1,043	20-36	2,503,200
Total and Average	51,618	40.66	182,999,300

It will be observed that the weighted-average thickness of the 11 seams under a varying acreage, taking the mean thickness of each seam for purposes of calculation, is but 40.66 in., and that the extraction per seam acre is 3,545 long or 3,970 short tons. Assuming that it costs more to develop and produce coal from seams that thin down to 20 in. and average but 40.66 in. in thickness than it does with seams averaging 64.8 in., this factor alone would tend to create a lower man-shift output than that obtained in our American mines.

There are, however, more serious handicaps applying to the British operation. Such include thickness of cover and weight of the overlying strata, the necessity of driving haulageways in the rock below the coal, added ventilation problems and protection of the surface against subsidence. Britain is very jealous of its tillable surface lands. The task of removing the negligible tonnage secured by stripping in Great Britain is made doubly hard by the fact that the surface soil is first removed and carefully stored and thereafter several inches of the subsoil is treated in the same manner. Then, when the spoil banks are carefully levelled, the subsoil and surface material are restored to the same position they occupied originally. Certainly, the British strip-coal producer does not get 15.46 short tons per man-shift worked by his employees. Britain goes out for the highest possible extraction also, which again costs man-shifts.

The Machinery Question

Much also has been said to the effect that the coal-loading machinery sent over to Britain has not pulled up production. Some of the promoters of this type of machinery have promised an immediate gain of 25 percent in production from machine over hand loading. This is not the experience of American coal operators. The cold facts are that while coal-loading machinery should and eventually will reach the proportions in Great Britain that exist here, those who pioneered this type of machine (as well as the now firmly established coal-cutting machine) found out early in their experience that it took some time to synchronize the efforts of the underground supervisors and the working force before they would make the best of the machines. There is nothing new in this situation. It is as old as machinery. America has a long way to go yet before all of its coal is loaded, or even partially loaded, by power-driven machines.

After attempting to clarify the difference in working conditions that govern in Great Britain and those that exist in America, there yet remains the more-important political situation that enters into the question of coal production. That the British mines are not producing enough coal to carry the nation's domestic load is an open secret. The Minister of Fuel and Power has said so repeatedly and posters that scream the National Coal Boards' slogan—"Work or Want!"—are to be seen in the various coal fields. Yet the daily and weekly production sinks. Some months ago, the Coal Board set 200,000,000 tons as the minimum-possible requirements for the year 1947. So far, the production is lagging and the most-rigid economies are being practiced—and coal is being purchased at high prices from American mines to fill the need.

Something big must be done if Britain is to recover its old spirit. A new leader who can re-form the industrial front line, such as was done by Churchill after Dunkerque, is tragically needed. The Labor Government lacks the courage to confess its mistakes. There is a lack of discipline in the mines and, with a shortage of labor, the mine officials are in an even-worse position to deal with strikes, slowdowns and absenteeism than were the operators before the government took over. The Labor Party over-promised and, with pay day here, they are in default. It was an Englishman, Isaac Newton, who discovered the law of gravity, and that law holds as good today as it did in 1665 when Newton observed the falling of an apple in his garden. If Britain fails—and some of its friends are now becoming very fearful—its first shove down the incline will come from its coal mines which, since the beginning of the industrial age, have been the foundation and keystone of Britain's greatness.

Problem for America

There is a growing disposition on the part of British political leaders to lean on America, forgetful of the fact that this country cannot restore and support the greater part of Europe and a substantial portion of Asia. As of June last, the American people have subscribed $23,350,000 for relief and rehabilitation work overseas. As of mid-August, the American corn crop—the most-important of all our grain crops—has been sharply cut by drought and searing winds. This means less pork, beef and poultry and higher prices for consumers. We have been a giving government for 15 years—first at home and now world-wide. It is time to read the crossing sign: "Stop, look, listen."

Britain should abandon its further ventures along the road to socialism, want and suffering. It has failed in the operation of its coal mines and it will make the same failure with its railroads and its steel industry. Some man with a stentorian voice should call the nation to eight hours' work, six days a week, foregoing all strikes, voluntary absenteeism and slowdowns. "Produce! Produce! Produce!" should be the cry from the government, the press, the radio and the pulpit. If the food allowance is not sufficient for those engaged in hard labor, amplify it, tightening up on those who could but will not work.

SWAMPTOWN, which three generations of anthracite miners have called home, before it was moved out of the path of the stripping units.

MOVED to higher ground a mile from the old site, this home may serve three more generations.

Move Houses by Rail To Clear Strip Area

Rail Moving With Mine-Car and Tractor Power Enables Jeddo-Highland Shop Crew to Shift Two-Family Houses One Mile in Five Days Each, Including Negotiating 6-Percent Grade and Crossing Railroad

MOVING SWAMPTOWN out of path of anthracite's fifth 25-yd. dragline highlights a new mass-production technique for moving large frame houses developed by the Jeddo-Highland Coal Co., Jeddo, Pa. The twelve best of a group of 18 two-family company-owned houses, in which three generations of miners have been reared, were "railroaded" to higher ground about a mile away. Each miner was encouraged to purchase his home and select the site for it on the new street, where it is handier to church, school and the "store-to-door" grocery-meat trucks that ply the highway.

This move was occasioned by recent technological developments in stripping equipment, particularly the dragline, which lends itself to outcrop stripping of pitching veins. In years past, some of the veins were stripped to the limits of the equipment available at the time. Today, larger walking-type draglines with 200-ft. booms have extended the economical limits of stripping and permit further salvaging of chain pillars and coal left by underground mining.

Faced with the problem of shifting a number of houses quickly, William E. Fichter, general outside superintendent, came up with the idea of mass-production moving on rails using tractors for power. Granted that the idea is too expensive for moving a single house, the scheme nevertheless, does offer a solution for moving a group—the Jeddo-Highland problem. In that case, the houses had to be moved quickly and approximately a mile.

As shown in the accompanying illustrations, a four-rail system, comprising two sets of 60-lb. standard-gage (4-ft. 8½-in.) track on 16-ft. centers, was used. Ties were spaced 4 to 5 ft. apart and the radii of the two right-angle curves were 81 ft. There was a 6-percent uphill grade between the curves where the four-rail system crossed the Lehigh Valley R. R. Where the track approached the new location for the houses the grade was downhill and varied from 4 to 6 percent.

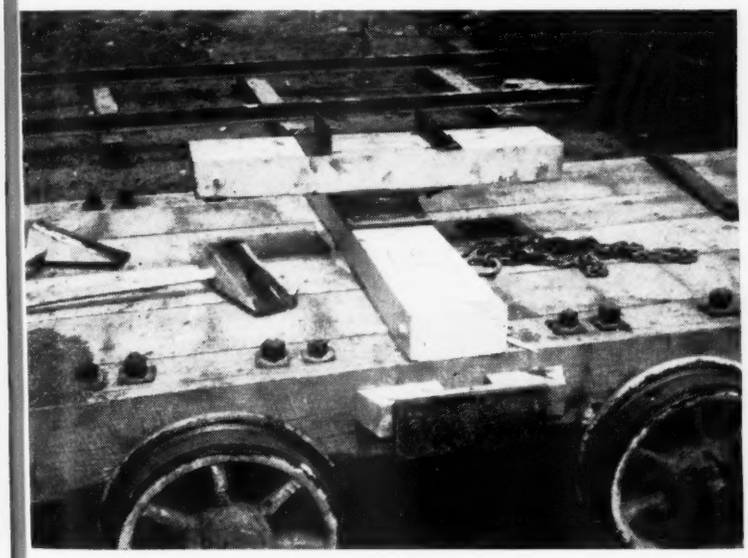
This system of house moving greatly reduces the "travel time" between the old location and the new once the house is made ready to go. There still is considerable work to be done in getting the house ready to move and also again at the other end of the line. Between these points, however, the moving speed, with this system, nears 100 ft. a minute.

The over-all moving time per house for the Jeddo job was approximately five days, including laying the new three-block-high foundation. Before moving each house, most of the household goods were removed except for some of the heavier pieces such as the piano. This was a precautionary measure easily taken since there were a few empty houses, among the six judged unfit for moving, for serving the families during the moving interval.

The houses, ten-room (two-family) 30-ton hemlock-spruce units with cement and stone foundations, had been a part of Swamptown for 60 to 70 years. When moving time rolled around, some of the officials were concerned about how the 18-ft. overhung section at the rear of each house would stand the trip. This section formerly was the summer kitchen for the two-family house and for years occupied a spot on the back of the lot. Eventually, it was moved up and joined to the house. Therefore, technically speaking,

1 TO START the move, workmen burrow through the stone, and cement foundations and prepare the house for its journey.

2 TRACKS pierce the basement wall to facilitate the moving of the two-family unit on four flat-bed-type mine trucks.



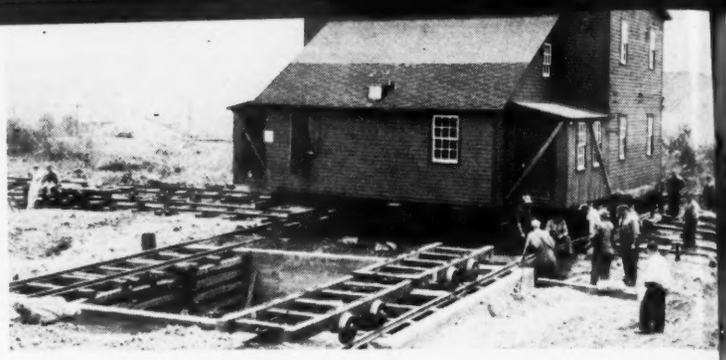
3 TURNTABLE BOLSTERS on the trucks speed the moving job and make it safer. The house travels up to 100 ft. per minute.

4 BETWEEN CURVES is this 6-percent uphill stretch of four-rail track that crosses the Lehigh Valley R. R.

5 PULLED by a tractor, the house rounds the last curve and it's downhill from here on to the new location.

6 DOWNGRADE, one tractor held back on the house while another pulled, keeping the house under full control.

7 BASEMENT is dug in approximately 9 hours. This back-hole digger also made the ditches for the water and sewer mains.



8 PLAIN TRUCKS transport the house across to its permanent foundation. In later moves steel rollers were used instead.

9 CONCRETE BLOCKS, three rows high, placed on the new foundation, complete the 6½-ft.-deep basement.

SUPERVISING the moving are William E. Fichter (left), general outside superintendent, and William A. Weigand, foreman.

it was simply a lean-to section of the house. To protect this section during the move, two 8-in. 42-ft.-long H-beams were used as stringers from the front to the rear of the house. To guard against springing of the over-hanging section of the H-beam underneath the back of the house, extra blocking was inserted.

In the moving procedure, which soon became a routine job for the crew, eight holes were punched in the old foundation, two at each corner, to facilitate the placing of the various beams and blocking. Track was laid under the house and the house lowered onto trucks. Four regulation pit cars, stripped down to the platform bed and with turntable bolsters added, were used to transport a house. With the house thus mounted, it was an easy task for a Type D-6 Caterpillar tractor to pull it. The tractor traveled on the bare ground between the two sets of tracks.

Swamptown was a community with one long street with houses on either side. Since all of the units were to face the same way at the new location, about half had to be turned. To save an about face, a U-turn was added to the four-rail system at the end of the street and the track brought back underneath the houses on the other side.

Once the tractor started with a house, the only delay was in crossing the right-of-way of the Lehigh Valley R. R. A train order had to be issued to permit such crossing, and then only between 7 and 11 a. m. Usually about 35 minutes was required to cross the railroad, including assembling and disassembling the crossing rails, boards, etc. After crossing the railroad and rounding the last curve the track grade was downhill. At this point the trucks were blocked and the D-6 moved to the other side of the house where it could hold back going down grade. A D-4 unit took over the job of pulling the house. This before-and-aft hookup controlled the movement of the house on the descending grade.

Prior to the arrival of the houses at the new location, basements were dug and foundations poured. A ¼-yd. back-hole digger excavated a basement in approximately 9 hours. This unit also dug the ditches for water and sewer mains. The foundation forms, in ten sections, were assembled in one day's time. Pouring of each foundation required another half day. Adding three rows of concrete blocks provided the basement with a headroom of 6½ ft.

The placing of the houses on the foundations would have been much easier had the tracks been located over the row of new basements, but spotting the houses at the preferred sites prevented following such a plan. Instead, the track was laid to one side. Then the house was spotted and the original trucks replaced by others for moving the house laterally over other rails onto its foundation. After several houses had been moved, steel rollers were used to complete the lateral movement onto the foundations in place of the second set of trucks. Thus spotted over its foundation, the elevation of the house was right for accommodating three rows of blocks. Temporary cribbing placed inside the basement permitted the removal of all rails and trucks and made possible the finishing of the foundation.

The houses appear to have stood the trip well. No plaster board cracks have been observed. All the doors swing freely and no window panes were cracked. Residents of old Swamptown had the benefits of electricity and running water. At the new location, so far unnamed, sewerage facilities have been added.

This project was carried out by the personnel of the Jeddo shop. Assisting Mr. Fichter were: William A. Weigand, foreman, and Alfred J. Radley, foreman of the wood shop.

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Efficiency in Coal Shooting; Proper Mediums and Methods

Shooting coal is a necessity complicated by the fact that no two faces are exactly the same. It is, in reality, an engineering problem involving the application of power, or energy, to the breaking of a solid material more or less homogeneous in nature. The energy, or power, commonly is derived from a sudden chemical reaction—in an explosive—producing a very large volume of gas. Or it may be derived from sudden release of compressed air or sudden vaporization of a liquid made by compressing a gas. Again, it may be mechanical or hydraulic in the form of wedges, pistons, expansible tubes or other devices. The latter, however, have not seen wide use although some, as well as cutting, are used as substitutes for powder, air or carbon dioxide in mining and loading machines (see *Coal Age*, June, p. 89).

Like many other problems in coal mining and elsewhere, most efficient shooting results when one does the things one logically should do. Perhaps the first thing is to look at the problem, meaning the material in place. Prior to the time the face-preparation cycle starts, the coal is fast at the sides, the back and the top and bottom. It must somehow be broken down and the only direction it can move is forward. It can be drilled and shot in that condition, and considerable solid shooting is done. But since the coal can move in only one direction and is fast in every other, the energy required manifestly is at a maximum.

To reduce the energy that must be applied in the form of explosive or otherwise, the coal normally is cut. Undercutting is in the majority, although topcutting is increasing in late years. Some middle cutting also is done, usually to eliminate partings or bands. This, in effect, divides a face into two parts, or cuts, one shot up and the other down, or vice versa.

With a top or bottom cut, the coal is fast on only four sides and is free to move in two directions—forward and down (or forward and up in the case of top cutting). Since, in addition, the coal must be freed from only four sides instead of five, it naturally requires less powder or other energy. Also, particularly where the coal is shot down and the kerf is properly bugdusted, the jar of the fall aids in breaking it up and helps still more in cutting energy consumption. Because less explosive is required, loading per hole can be reduced and, consequently, there is less chance of the stemming being blown out. Therefore, cutting also promotes safety.

With shearing, the coal can move in three directions and needs to be broken loose from only three sides instead of four or five. Energy consumption in the form of powder, air or carbon dioxide is further reduced. At the same time the output of cuttings, or bugdust, is increased, although in many cases the gentler breaking made possible by shearing results in an increase in coarse-coal yield more than offsetting the greater volume of cuttings.

The common sources of energy for breaking the coal are, as noted, explosives and compressed air or carbon dioxide suddenly released from steel tubes. The choice of the proper explosive or of the proper air or carbon-dioxide pressure is one of the most critical factors in the shooting cycle. Since the faster explosives tend to pulverize a lot of coal before the main breaking job is completed, the tendency is to use the slowest practicable. At the same time, the explosive or other breaking medium, within the limits of the maximum charge, must supply enough energy to shear the coal along the top (or bottom), sides and back, break it up small enough for easy loading, although without excessive fines, and roll it out where it is easy to get at.

When the problem is analyzed, therefore, it can be seen that the breaking medium has a real job to do. Consequently, it is difficult to be overcareful in its selection. Selection should start with a thorough study of the character of the coal and other natural conditions. A tough elastic coal, or one containing bands or partings that must be broken, usually necessitates a different type of explosive as compared to a softer, more friable type that requires little more than dropping to the floor to break up.

The size of the stick also is a factor weighted rather heavily by some operating men. Since trying to use two types of explosive at the same time leads to complications, getting a certain breaking effect requires attention to stick size, principally diameter. For example, in one mine with a strong band near the bottom, numerous sulphur balls, fairly hard coal and average height and depth of cut, concentration of the breaking force at the rear of the cut might be desirable to shear the coal loose at the back and provide push to roll it out. Since a more powerful explosive would increase the undesirable pulverizing effect, the answer in this case would be a larger stick of the slower type. On the other hand, in a thinner, more-friable coal, cut fairly deep and without bands, it

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might be desirable to string out even the slowest powder to distribute the breaking effect and reduce the tendency to shoot down into the kerf at the back. Under some conditions, therefore, stick size can be rather important in getting maximum efficiency in shooting.

Even more important than the type, size and other characteristics of the breaking medium is the way in which it is used. In a continuation of this discussion next month, some of the fundamental factors in efficient use of breaking mediums will be outlined.

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Good Mine Ventilation

By D. W. HALSTEAD
Assistant General Mine Foreman,
Red Jacket Coal Corp., Wyoming, W. Va.

Ventilation is of the first and foremost importance in coal mining. Without proper ventilation, employees' and management's health is at stake and there always will be the danger of an explosion as a result of improper ventilation.

Ventilation, as applied to mines, means providing sufficient air current to make the air wholesome and healthful and to render harmless and carry away all poisonous and noxious gases. Proper ventilation calls for a knowledge of state mining laws, a knowledge of poisonous and dangerous gases and knowledge of the operation of fans and ventilation controls.

It is a well-known fact that many mining men still adhere to the old system of starting an air current and continuing it on the same course over the entire mine. This definitely is a mistake.

Splitting of the air current is very essential from an economical point of view. Ventilating pressure (water-gage) is reduced, better and more positive ventilation is produced and the power bill is reduced as a result of decreased load on the fan. These results are accomplished because of the shorter course of the air, excepting the free, or open, split, which in turn reduces the resistance that must be overcome by the mine fan.

Any phase of mine ventilation can fail at any time. Consequently, ventilation must have constant supervision. Every fan should be equipped with a water gage and should be checked regularly from both the safety and economy standpoints. A sudden increase in the water-gage warns of a recent slate fall or of a body of water collecting in the airways. A sudden decrease in the water-gage warns of a short circuit. This usually is the result of one of three things: a door left open, a stopping torn out or a regulator interfered with.

To have adequate ventilation, a mine must first have a fan, or fans, capable of producing the necessary air volume and ventilating pressure. Effective and efficient ventilation control is best attained by airways with sufficient cross-sectional area, overcasts, regulators, permanent stoppings (non-combustible), temporary stoppings and line brattice.

Doors and check curtains are not recommended because of fire hazard, the ease with which they can be torn down or left open and leakage of the air current. When it is absolutely necessary to use doors or check curtains, they should be hung in pairs to form an air lock, and should be hung far enough apart to accommodate the longest of trips.

Ventilation should be efficient and economical. If the two words, "efficient" and "economical" are given their correct meaning in use, the ventilation system will be adequate and will meet with the strictest approval tests. —*The Red Jacketeer.*

•

Essential Facts About Accidents

We have from time to time experienced considerable difficulty in obtaining all the facts in the sequence leading up to and involved in the actual occurrence of accidents, thereby making it very difficult to analyze intelligently the contributing factors and causes and arrive at logical corrective measures.

The burden of responsibility for accidents rests with the management, particularly in the eyes of the public, and, by the same token, the foreman is the man who must put into effect corrective measures, so as to be reasonably assured that there will not be a repeat of the same accident.

Some of our foremen are doing a real job uncovering the facts concerning accidents, even to the point of putting a share of the responsibility on the injured man's wife as being a contributing factor in the occurrence of an accident. As a very recent example, a motorman was opening a can of lunch meat with a hatchet. He missed and hit the middle finger of his left hand with the hatchet.

The injury, as described by the hospital report, was: "laceration of the middle finger, left hand, with chip fracture of proximal end of distal phalanx, requiring suturing and splint."

This is one accident that should warrant quite a discussion as to who was responsible. What do you think? From the facts derived from this accident investigation, it appears that we will have to make a drive to see that lunches are properly prepared or furnish employees with can openers of an approved type.

Another employee recently sustained injuries to a foot resulting in permanent impairment. He had been instructed by his foreman in the potential danger of a protruding brow of slate. The employee proceeded to perform his duties contrary to instructions. Facts concerning this accident place the responsibility jointly on the injured employee and on his foreman. While the employee had been warned by the foreman of the danger, he apparently was not yet convinced that it existed. The foreman failed to follow through to see that his instructions were thoroughly understood and that the employee performed his work accordingly. The miner and foreman were men of long experience underground. Both suffered losses according to the degree of responsibility. It was an old accident just recurring.

A motorman reported to his foreman that his locomotive was unsafe for the trip of loads he had been given orders to move. The employee cited the faulty mechanism but proceeded according to instructions. A runaway occurred, resulting in considerable damage and loss of production, but luckily personal injury was avoided. Investigation and facts revealed that the foreman was responsible, because: (1) the grades on the haulage road demanded equipment in good operating condition, and (2) the potential dangers from a runaway trip were such that a distaster could have occurred. Most certainly, there should have been no "chance-taking."

A ring-wearing employee sustained laceration of the finger when the ring became fouled while descending the rungs of a railroad car. Disability was lengthy, and it most certainly would have been avoided had the employee not been wearing the ring. Certainly, rings and other personal identifications of similar nature have no place in proper safety attire; yet, since this accident, several more ring injuries have occurred. Rings should be left at home to prevent fingers from being stripped to the bone.

The accidents related did not happen to another company; neither are they far-fetched. They actually are a part of our own recent experience. They do not represent the complete picture but are intended as a cross-sectional view of causes and contributing factors, and a means of illustrating the responsibilities of both management and employees. The elimination of accidents is a joint responsibility and requires the cooperation and whole-hearted support of every man, woman and child. Somewhere along the line, you may be a contributing factor in potential accidents. Check up on the facts and proceed according to analysis.

Hazards are clearly indicated by accident experience. It is, therefore, suggested that safety committees and management analyze accidents very carefully and lay plans to eliminate the possibility of a recurrence. The following outline is suggested as an aid: (1) summarize the causes, (2) discuss them with all your foremen, (3) have foremen discuss causes of accidents with their men, (4) decide on corrective measures and (5) apply corrective measures diligently.
—*Safety News*, W. Va. Coal & Coke

CONTINENTAL BELT CONVEYOR IDLERS ROLL ON TIMKEN BEARINGS

All types of belt conveyor idlers now manufactured by the Industrial Division, Continental Gin Company, Birmingham, Alabama, are equipped with Timken Tapered Roller Bearings. Result, the essence of smoothness in operation; no belt drag — belts last longer; less lubricating attention required — effective sealing keeps lubricant in, dirt and moisture out; lower maintenance; longer equipment life.

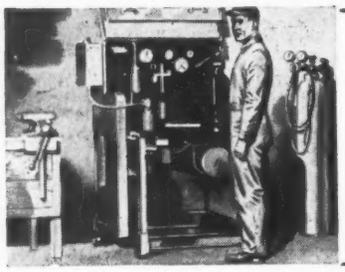
Inside or out — rain or shine — hot or cold, Timken Bearing Equipped belt conveyors deliver all kinds of material — from light grains to heavy ores — any distance quickly, constantly, economically. Make sure you have them. Look for the trade-mark "TIMKEN".

THE TIMKEN ROLLER BEARING COMPANY, CANTON 6, OHIO

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS

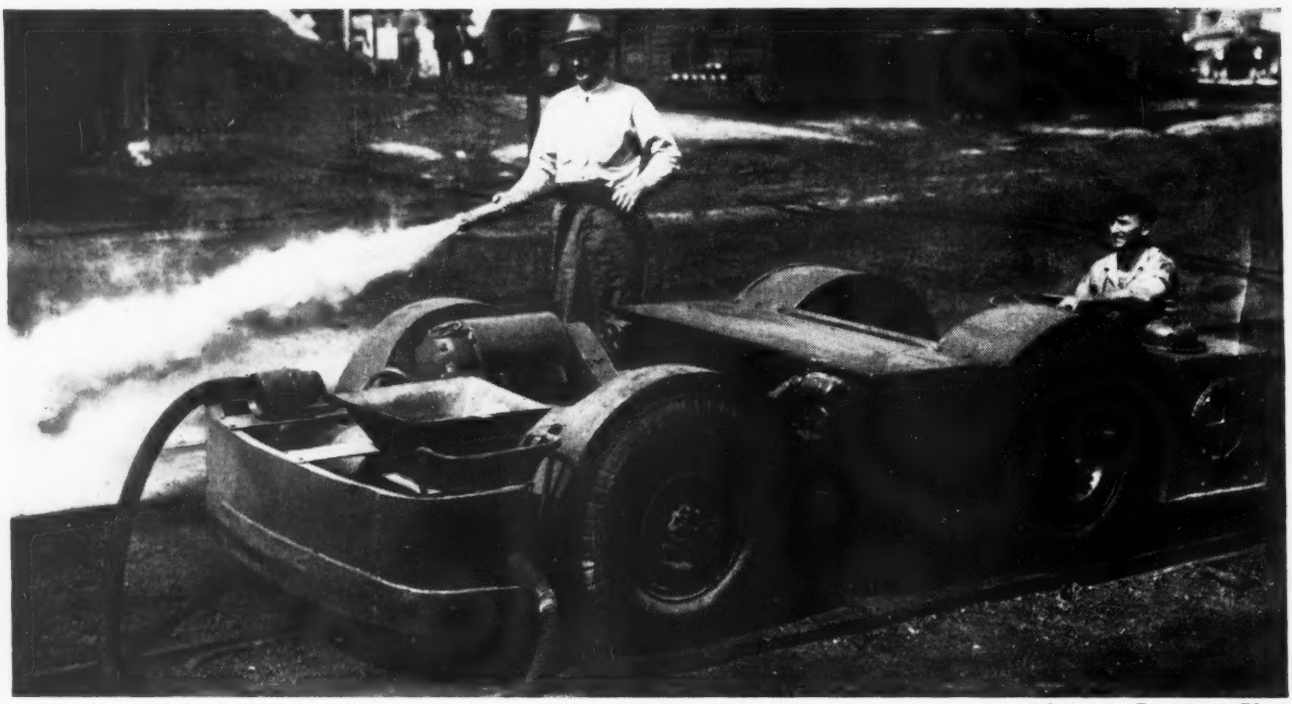
Application of Timken Bearings in Continental belt conveyor idlers.

NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL ◫ AND THRUST ←◫→ LOADS OR ANY COMBINATION ←◫→



Operating Ideas

Rubber-Tired Rock-Dusting Machine



Johnstown Democrat Photo

THIS SELF-PROPELLED rock-dusting unit was developed at the Revloc (Pa.) mine of the Monroe Coal Mining Co. It employs a shuttle-car chassis with a battery for power. Rock dust is distributed by a M-S-A "Bantam" unit mounted on the front end.

Metal Band Saw Cuts Sprocket Teeth

A 4-IN. CIRCLE in a steel plate is cut by John O. Gill, master mechanic, to demonstrate the metal-cutting vertical band saw.

CONSIDERABLE TIME is saved on numerous repair and rebuilding jobs by a metal-cutting vertical band saw in Lancashire No. 15 shop of Barnes & Tucker Co., Bakerton, Pa. John O. Gill, master mechanic, says he was told that this is the first saw of its type to be installed in a coal-mine shop.

A soft-steel plate 1 in. thick can be sawed at the rate of 1¼ in. per minute. Maximum capacity is a plate or block 10 in. thick. Machining of edges is eliminated or reduced by the smooth cuts that can be made. Cutting of curves of small radii is another great advantage of the saw. In emergencies sprockets have been cut out of steel plate and the teeth needed little or no smoothing. A ⅛-in. saw band can cut a ⅛-in. radius and a ½-in. band will cut a 2½-in. radius.

Besides having a built-in motor drive, the saw is equipped with a compressor and adjustable air nozzle for pushing away the cuttings so as to not obscure the line. This machine is the Doall Model ML, made by Continental Machines, Inc., of Minneapolis. Saw bands are made by the Doall Co., Des Plaines, Ill. The machine has been in use at Barnes & Tucker Co. since April, 1943.

Release Your Production BRAKES...

Production is too frequently slowed up by equipment failure . . . by long shutdowns for maintenance and repairs. Give your men Time Tested trouble free Cincinnati Chains, Bits and Cutter Bars.

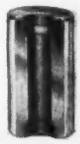
CINCINNATI
DUPLEX CHAIN

Give Your Men *Trouble Free* CINCINNATI CHAINS, BITS and CUTTER BARS . . . . .

There is nothing more important today than dependable, trouble free equipment . . . Cutter Chains, Bits and Cutter Bars that hold up under tough production schedules. Cincinnati Chains are EXTRA TOUGH . . . chains that are engineered not only to reduce excessive wear and tear on the entire cutting machine, but which place the greatest wear on inexpensive easily replaceable parts. Machine runners and bosses alike praise their efficiency while maintenance men say they're practically trouble free. This means a minimum of maintenance and a maximum tonnage at a lower cost.

Easily replaced, hardened alloy steel Connector Insert gives fresh from the factory joint accuracy to worn connector.

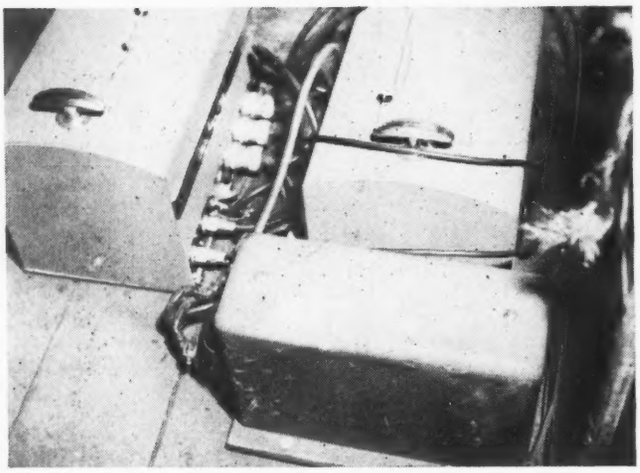
Alloy steel, heat treated Rivet holds bearing pin against longitudinal displacement. Easily removed.



Hardened Eccentric Pin puts joint wear between pin and insert . . . doesn't turn in block. With replacement of pin and insert the joint is like new.

THE CINCINNATI MINE MACHINERY CO.

2983 SPRING GROVE AVENUE • CINCINNATI, OHIO



TRANSMITTING-RECEIVING assembly for radio-telephone is located on truck floor behind cab seat.

TELEPHONE and control unit below dashboard are within driver's reach. Bell and lights give signals.

Radio-Telephone for Strip-Pit Tipple Foreman

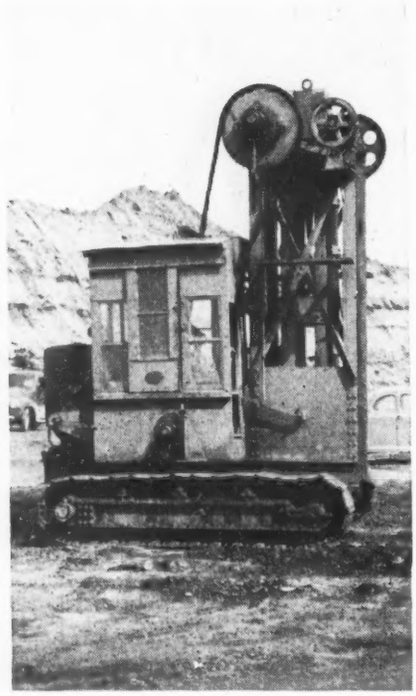
COMMUNICATION between the Mayview tipple at Bridgeville, Pa., and central offices of the Pittsburgh Coal Co. at Library, Pa., is provided by a radio-telephone mounted in a stationary truck that serves as an office for the tipple foreman. A.c. power tapped from a nearby transmission line runs a small motor-generator set to supply d.c. current for the transmitting and receiving equipment, which is mounted, as shown in the illustration at the left, on the truck floor behind the cab seat. The instrument and the control unit are mounted under the dashboard, as can be seen in the illustration at the right.

Calls, routed through a special office of the telephone company, may be made from any standard telephone to the radio-telephone or from it to any standard phone. When talking into the radio-telephone, the speaker presses a small button midway the length of the instrument, which activates the transmitter. To listen, he releases the button.

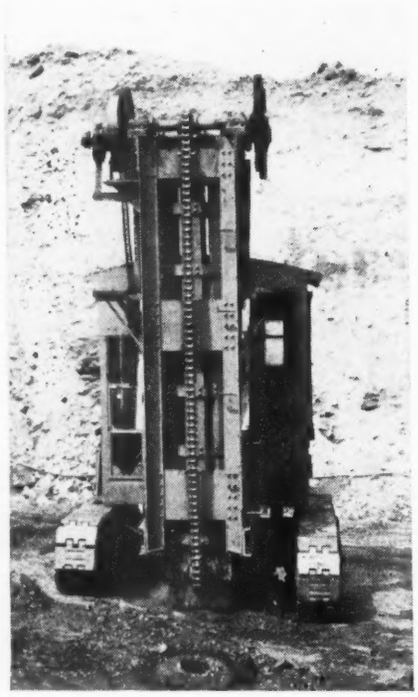
The receiving apparatus runs constantly during working hours. A green light on the control unit shows that the equipment is energized. A bell signals an incoming call. If no one answers, the bell stops ringing but a white light on the control unit flashes on to show that the operator has rung. It burns until someone answers. Radius of satisfactory operation is about 50 miles from the nearest radio-telephone central office.

Though the present installation at Mayview is stationary, it can be made mobile by adding an oversize generator to the truck engine and providing a heavy-duty battery for use while the engine is idling or cut off.

Pinning Machine Readies Coal for Loading



THE 5,600-LB. weight is raised in the guides approximately 12 ft. before being dropped an average of six or seven times a minute.



THE PINNING MACHINE, moving backwards, pins the 29-in. Tebo seam at intervals of 3 ft.

THE 29-IN. Tebo seam is broken by a pinning machine instead of being blasted at the Reliance mine of the Crowe Coal Co., Clinton, Mo. The machine, shown in the accompanying illustrations, is built by the United Iron Works, Pittsburgh, Pa., and is powered and carried by a TD-14 International diesel engine mounted on a Caterpillar unit. The machine and its operator replace three men.

The pinning machine, using two sets of lifting lugs on a continuosly rotating chain, hoists and drops a 5,600-lb. weight an average of six or seven times a minute, the strokes being timed so that the Caterpillar moves forward or backward about 3 ft. during the hoist. When the weight drops, a 14-in.-long pin on the bottom side of the weight pierces the coal.

The loading shovel can work the seam easily after it is pinned. The pin tapers from 4 in. in diameter at its base to 2 in. at the tip.

Pinning is believed to be specially adapted to the Tebo seam, which is harder near the top than at the bottom. In addition, it is less hazardous than blasting and is cheaper, savings being estimated at $1,000 a month for a 35,000-to-40,000-ton month.

Are Your COAL PREPARATION Plans Keeping Pace with the Industry?

The coal industry reached new heights of activity in 1946 . . . and with it grew the need for larger and more modern preparation plants. To keep pace with the growing industry, you are likely planning new preparation facilities. Let the CHANCE SAND FLOTATION PROCESS help you solve *your* bituminous coal cleaning problems. Write today for full details.

THE HEART OF THE PREPARATION PLANT

United Engineers & Constructors Inc

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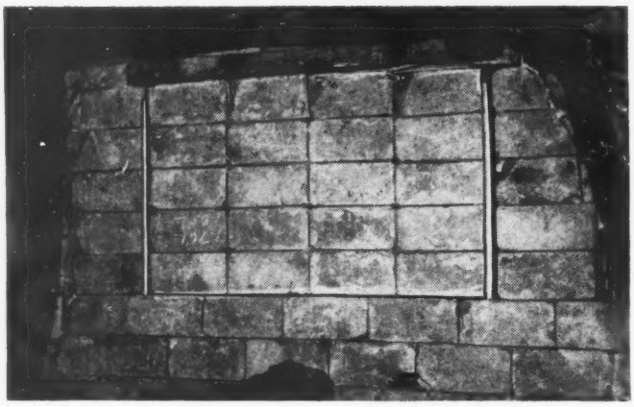
Tongue-and-Groove Cement Blocks Recovered



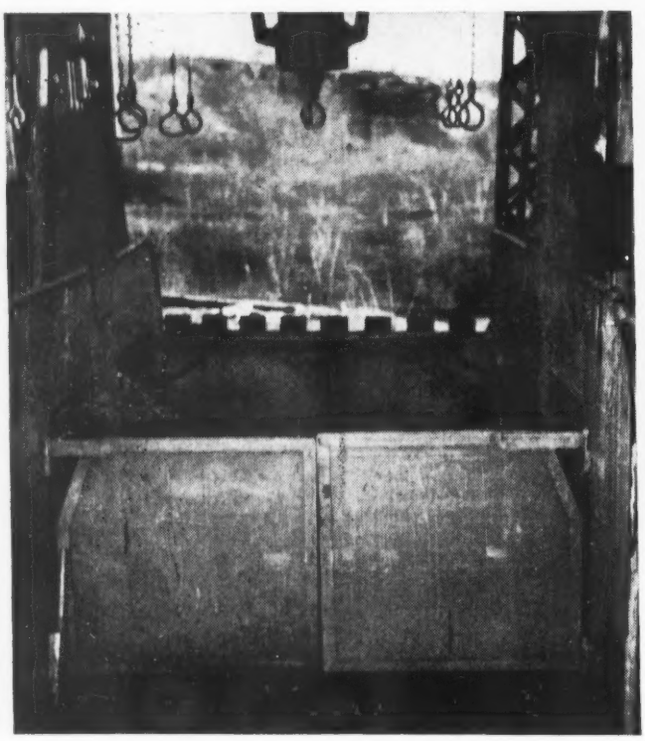
TEMPORARY STOPPINGS are 4 in. thick and plastered on the back. Center section of 20 blocks will be removed to make way for the shaker pan line.

FOUR-INCH recoverable concrete blocks for temporary stoppings between the belt heading and airways in duckbill sections, with lift-out sections for installing the pan line, were adopted at No. 3 mine, Rail & River Coal Co., Bellaire, Ohio, because of the shortage and high price of lumber. Another advantage of the recoverable cement stoppings is that they are fireproof.

Blocks are 4x8x16 in. and have tongue-and-groove ends. The 4-in. wall is laid with a very thin spread of low-strength mortar in the horizontal joints. A section 64 in. wide and 32 in. high is laid without broken joints and with ¾-in. wooden strips at the ends. The back side of the wall then is plastered. When the shaker conveyor is to be installed, this 32x64-in. section is easily removed and a curtain of double-thickness brattice cloth is installed to block off the space around the pan line.

The whole brattice is taken down when the panel is finished. As a rule, the cement blocks are used four to five times before they become too badly broken and must be discarded.

Cage Safety Gates Swing From Wall Recesses



SAFETY GATES are in place for man-trip-caging service.

FLUSH-TYPE safety gates have been adapted to steel cages at the No. 2 shaft and meet the recommendations of the federal mine inspector, writes F. L. Zollinger, colliery superintendent, Loree colliery, The Hudson Coal Co., Plymouth, Pa. The close clearance between the mine car and the steel cage prevented the installation of the ordinary safety gate which usually protrudes from the side of the cage. The new gate overcomes this condition.

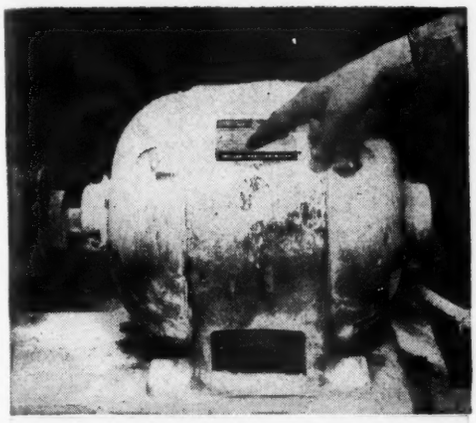
The double gates, shown in the accompanying illustrations and designed by Thomas Carey, maintenance foreman, keep the men riding the man-trip well back from the edge of the cage. At other times, when coal is being hoisted or supplies lowered, the gates are swung back into the side recesses of the steel cage. Here they cannot

HOW ONE HALF of a gate swings back into its wall recess where it is out of the way for normal car-caging operations.

interfere with the normal caging operations. Gates of course, are arranged at both ends of the cage.

Don't Hide Your Talents!

Why hide under the proverbial bushel basket the operating ideas you've developed or adapted? Not only will you get well-deserved credit from men in the industry, but you'll be helping others lick the same tough problems if you let us pass them on to the thousands of Coal Age readers. And for each mechanical, electrical, operating or safety idea, Coal Age, on publication, will pay you $5 or more.



Keeps Its Bearings in "Dust Bowl"

Ordinarily, we wouldn't recommend that you use an open motor on a job like this. This Tri-Clad motor drives a boiler-feed pump in the National Gypsum Company plant at Clarence Center, N. Y. The air surrounding the motor is constantly filled with gypsum dust which must be kept out of the bearings. And it *has* been kept out of the bearings of this Tri-Clad motor, thanks to its specially designed bearing housing and seals. We believe that the Tri-Clad motor you see here proves that even where dust, moisture, or some other hazard is extremely severe for open-motor applications, the extra protection afforded by Tri-Clad motor construction results in longer motor life and lower upkeep.

The toughest motor yet!

The Tri-Clad totally enclosed, fan-cooled motor is designed for use in adverse atmospheres — in iron dust, out of doors, in hazardous areas, and chemical atmospheres. It gives you these important construction features:

- **A cast-iron, double-wall frame which completely encloses and protects the windings and punchings.**
- **A nonshrinking compound around motor leads which protects motor interior from dust and moisture.**
- **A rotating labyrinth seal which further protects the motor interior from damage by foreign matter.**

TRI CLAD
REG. U.S. PAT. OFF.
MOTORS

ON 1,220,000 MOTORS

TRI CLAD

THE SYMBOL OF

EXTRA PROTECTION

Announcement of the Tri-Clad motor, back in 1940, ushered in a new concept of general-purpose motor design. Substantially increased horsepower-per-frame-size was one feature. Smarter appearance was another. But what really sold more than a million Tri-Clad motors is the *extra protection* we built into them.

Today, with the "family" including dripproof motors, vertical motors, gear-motors, capacitor-motors, and totally enclosed motors, Tri-Clad motor is, more than ever, the motor that means basic protection, dependable performance, and minimum upkeep. *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

EXTRA PROTECTION... **AGAINST PHYSICAL DAMAGE!**

Rigid cast-iron frame and end shields protect vital parts from external abuse and prevent resonance. Because they're not at the mercy of a coat of paint, they strongly resist chemical attack and dampness. Cast iron also gives you tight, *metal-to-metal* fits between end shields and frame.

EXTRA PROTECTION... **AGAINST ELECTRICAL BREAKDOWN**

Windings of Formex* wire together with improved insulating materials, reduce the chances of electrical failure. Heat is dissipated quickly — motor stays young for years and years.

EXTRA PROTECTION... **AGAINST OPERATING WEAR AND TEAR!**

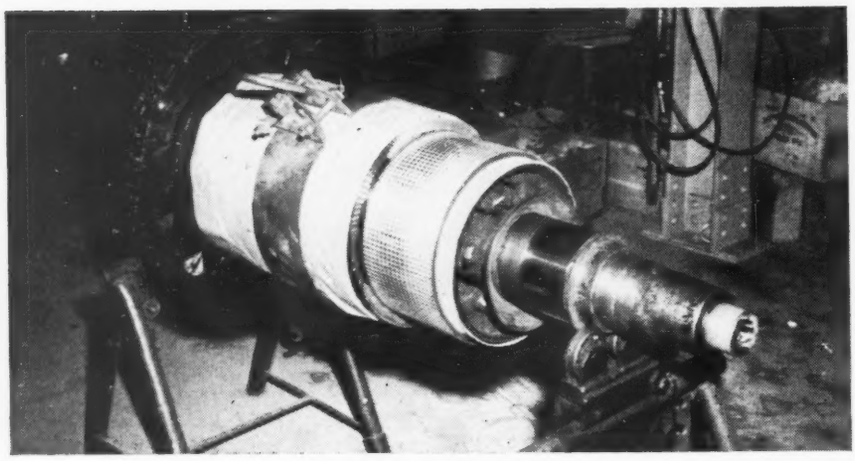
Bearing design affords longer life, greater capacity, improved lubrication features. Bearing seals retain lubricant, keep out dirt. One-piece, cast-aluminum rotor is practically indestructible.

*Trade-mark reg. U. S. Pat. Off.

GENERAL ELECTRIC

700—256C

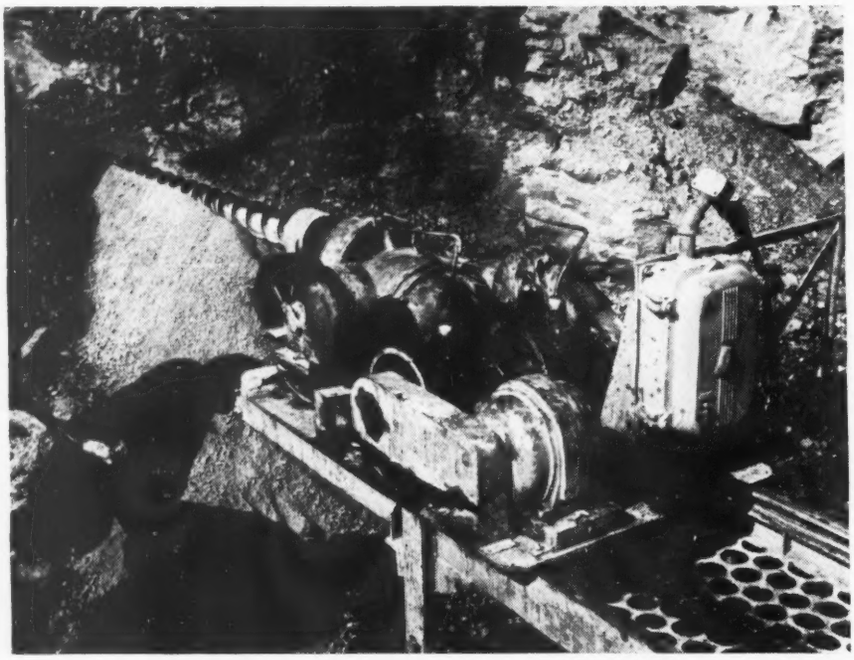
Commutator Grooving Boosts Efficiency



CUTTING GROOVES around the commutator of a 125-hp. General Electric MDS 416 motor used on a 750 shovel helps remove foreign matter from the brushes and provides an escape for gases forming under the brushes. The work is done in the electrical shop of the Pittsburg & Midway Coal Mining Co., West Mineral, Kan. Double-thread grooves are cut 1/16-in. deep at ½-in. intervals around the commutator and cross the mica slots of the same depth. Thus a waffle-like pattern is obtained, as shown in the photograph. A grooving lasts six or seven years.

GROOVES in the commutator improve performance of large electric motors.

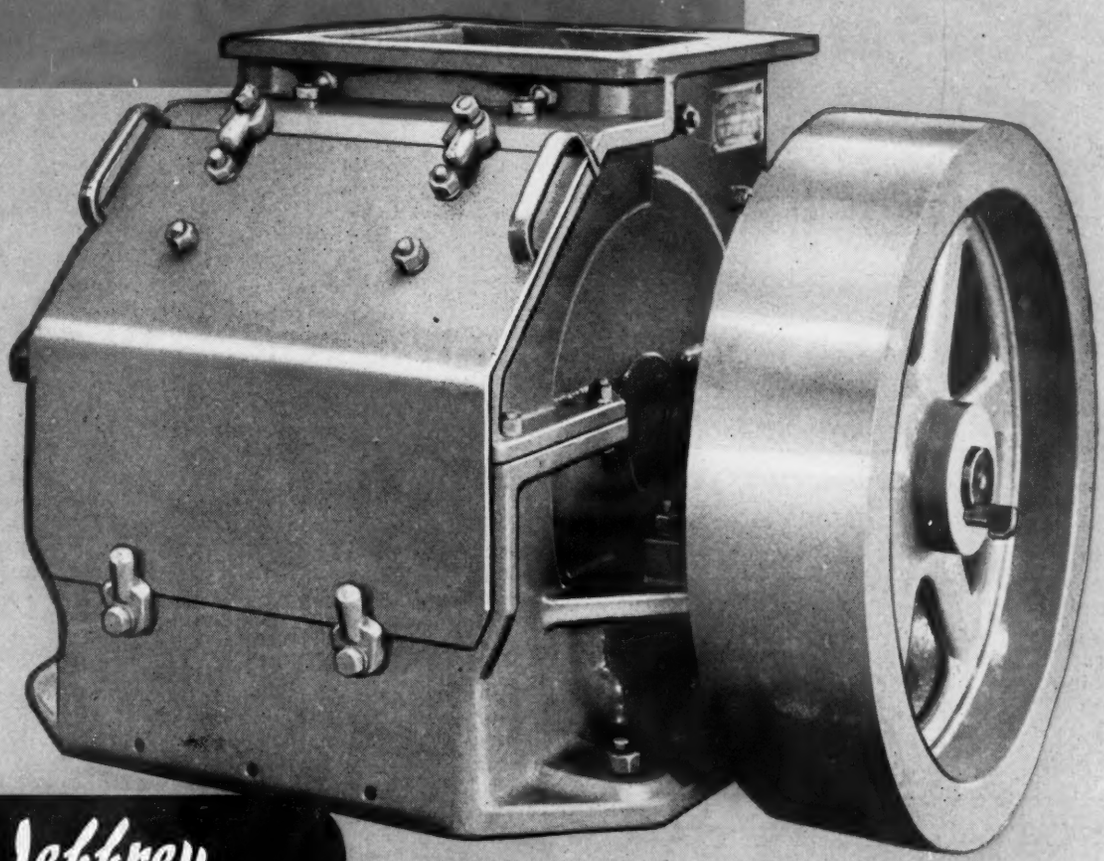
Home-Made Horizontal Drill for Highwall Work



A HOME-MADE HORIZONTAL DRILL, shown in the accompanying illustrations, has worked so well that it has become standard equipment at the Mark Twain mine, Huntsville, Mo.; the Tiger mine, Hume, Mo.; and the Old Mac mine, Red Oak, Okla. All of these are stripping properties of the Sinclair Coal Co., Kansas City, Mo.

The auger is powered by a 15-hp. gear motor. Auger speed is 322 r.p.m. A 1½-hp. gear motor and two Chevrolet transmissions provide from 1½ to 42 ft. per minute on feed. A two-man crew operates the assembly and it is advanced from one place to the next by a team of horses, after the drill unit has been run back on the frame for balancing on the wagon. Drill augers, carried on the wagon, as shown in the lower illustration, are handy for workmen.

FROM LUMP TO STOKER SIZE IN ONE CRUSHING OPERATION



Jeffrey

18 x 12 FLEXROLL® COAL CRUSHER

(Patented)

This small-capacity unit — for small coal mines and coal yards — is high in crushing efficiency but low in cost and maintenance. Control the top size of stoker coal by crushing oversize from screen with this low-priced crusher. Bulletin No. 777 gives dimensions, capacities and "on-the-job" installation views.

THE JEFFREY MANUFACTURING COMPANY

912-99 North Fourth St., Columbus 16, Ohio

ESTABLISHED 1877

Complete Line of Material Handling, Processing and Mining Equipment

Baltimore 1 · Birmingham 3 · Boston 16 · Buffalo 2 · Chicago 1 · Cincinnati 2 · Cleveland 13 · Denver 2 · Detroit 13 · Harlan · Houston 5 · Huntington 19 · Jacksonville · Milwaukee 11 · New York 7 · Philadelphia 3 · Pittsburgh 22 · St. Louis 3 · Salt Lake City 1 · Scranton 3

Rope-Haul Follow-Up Motor Has Safety Stop

BY FLIPPING a simple lever, the motor can drop the two 4-in. pins between the ties to stop a runaway trip.

TWO SPUDS THAT DROP down between the ties constitute a safety stop to prevent runaways in case of uncoupled cars or a broken rope on the main haul in Lancashire No. 15 mine, Barnes & Tucker Co., Bakerton, Pa. They are arranged on the inby end of a 20-ton three-truck General Electric locomotive that is coupled to the back end of all trips pulled out of the mine.

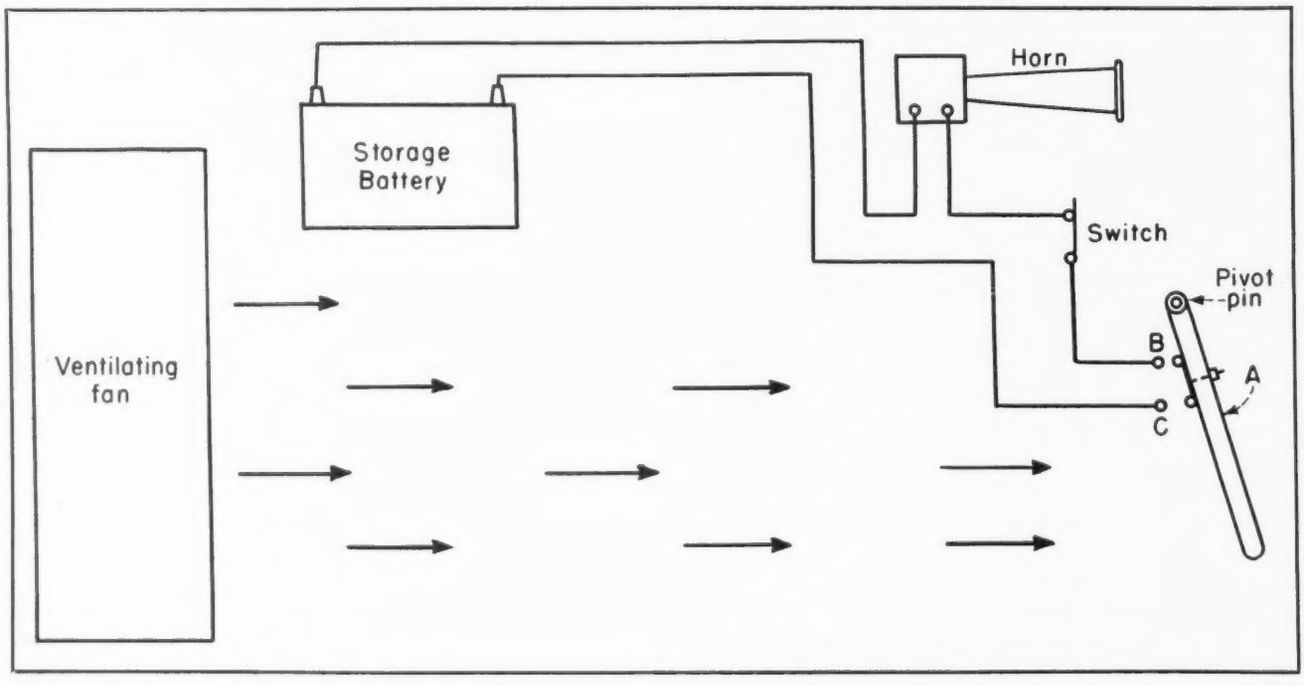
The spuds are 4-in. round solid-steel pins that slide in guide holes in an extension from the bumper. At the top, the pins are yoked with a cross bar that has a hole at the center. A 1-in. pin through that hole and through matching holes in a bracket attached to the top of the bumper supports the pair of spuds in a raised position.

A wire rope attached to the pin extends across the top of the locomotive to a lever at the cab end. By a jerk of this lever the motorman can pull the pin and drop the "anchor." A spring holds the pin in position.

The rope-haul section of the main haulage extends 7,000 ft. in from the drift portal and on this section the grade is 3½ percent against the loads. In beyond this rope haul locomotives alone handled the trips. Fifty 3-ton cars constitute a trip and 6½ minutes is required for 7,000-ft. rope haul. If the motorman of the 20-ton locomotive is on his toes and drops the safety stop immediately a trip stops and before it begins to move backwards, there is no damage to the ties. If, however, he hesitates and drops the stop after the trip has gotten a start, the result may be a number of broken ties before the trip is halted.

This safety stop was patented by Ruben West, a former employee of the Barnes & Tucker Co.

The CLARKSON



Swinging Vane Signals Fan Failure

THE SIGNALING mechanism for use with a mine fan shown in the accompanying drawing is fool-proof if the batteries are inspected regularly and kept properly charged, says James T. Sauls, Powellton Coal Co., Mallory, W. Va. When the fan, for any reason, stops propelling air past the swinging vane, A, the vane swings back, closing the circuit from the storage battery through the stationary contacts, B and C, to the signaling horn or other indicator.

The CLARKSON Redbird

THE LOWEST LOADING MACHINE ON WHEELS

TYPE 24 BB

Quick operating hydraulic controls conveniently located in one central unit.

Telescopic hydraulic jack adjustable to any car height — with oversize cylinders for low hydraulic pressure.

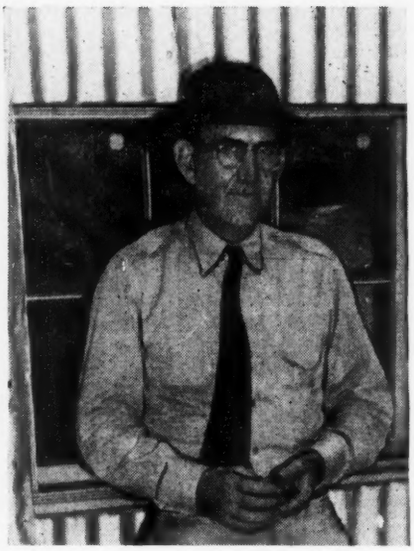
Rear conveyor ELEVATED IN ONE SECOND *to meet any car height.*

Conveyor in TRAVELING POSITION WELL BELOW TROLLEY WIRES *even in very low coal — highest point of conveyor pan only 23 inches from rails.*

The CLARKSON MANUFACTURING CO.
Nashville
Illinois

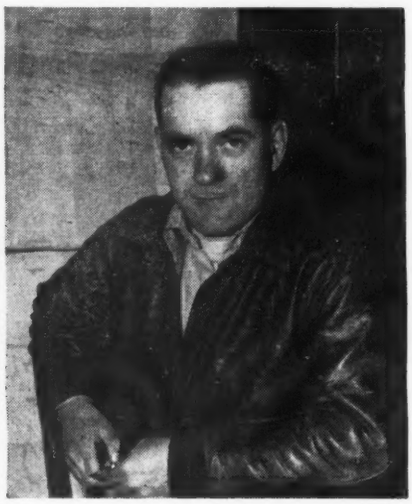
COAL MEN

At Mine No. 24, Island Creek Coal Co., Ragland, W. Va., standing: W. C. Maynard (left), tipple foreman; R. C. Ison, section foreman; Raymond Yale, chief electrician; Joe Danish, mine foreman, and Frank Hunter, section foreman. Seated: Ralph Thompson (left), superintendent; J. J. Curry, section foreman, and Roscoe Kelley, section foreman.



George B. Baker, vice president and general manager, Tierney Mining Co., Stone, Ky.

C. W. Imlay, superintendent, Bevier Coal Co. (formerly Binkley Mining Co. of Missouri), Macon, Mo.



Merle Guthrie, assistant superintendent, Tiger mine, Hume-Sinclair Coal Mining Co., Hume, Mo.

Charley Basler, pit foreman, Bevier Coal Co., Macon, Mo.

J. K. Berry (left), industrial engineer, Island Creek Coal Co., Holden, W. Va., and W. A. Haslam, division superintendent, Island Creek Coal Co., Ragland, W. Va.

R. D. Faddis (left), safety engineer, Sunnyside No. 2 mine; R. G. Heers, project manager, and John Cullen, superintendent, Kaiser Co., Inc., Sunnyside, Utah.

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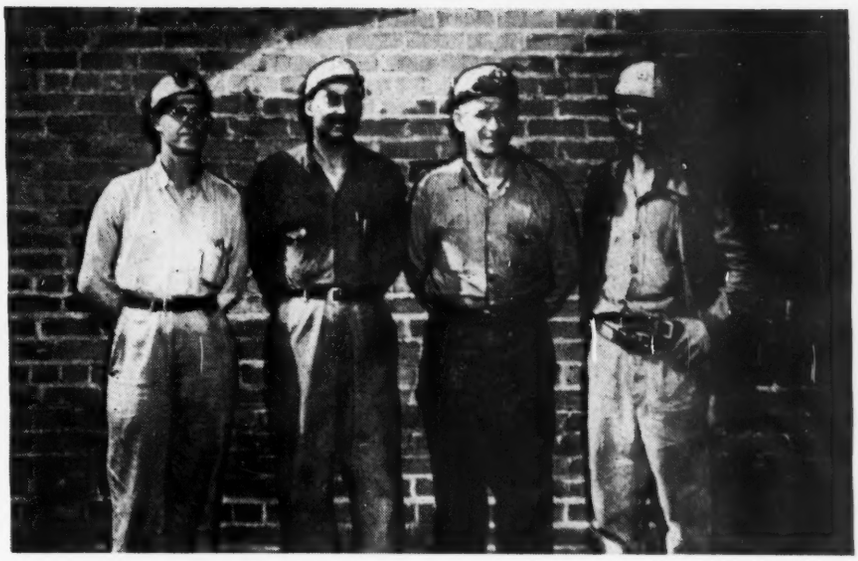


J. S. Wells (left), superintendent; J. P. Schwartz, mine foreman; Jack Premo, night foreman, and M. F. Leeper, safety inspector, Maitland mine, Koppers Coal Division, Eastern Gas & Fuel Associates, Maitland, W. Va.

ON THE JOB

B. H. Williams, superintendent, Castle Shannon Coal Corp., Coverdale, Pa.

F. J. Foresman, director of personnel, Pittsburg & Midway Coal Mining Co., Pittsburg, Kan.

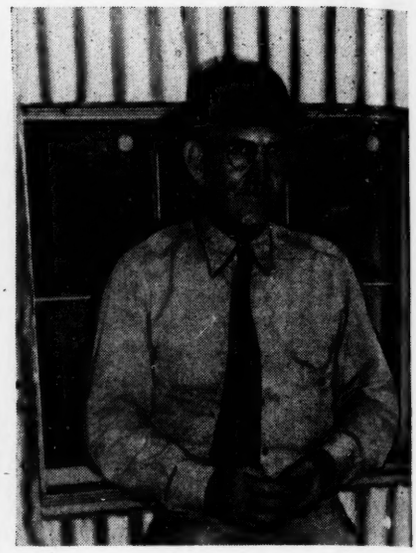
H. H. Elkin (left), superintendent, and E. P. Mulloy, master mechanic, Uta-Carbon Coal Co., Rains, Utah.

H. C. Marchant (left), assistant to the president, and J. B. Burns, general superintendent, Colorado & Utah Coal Co., Mt. Harris, Colo., at headquarters in Denver.

W. J. Hillabrant (left), superintendent, and D. Batchelor, outside foreman, Utah Chief mine, Lion Coal Co., Wattis, Carbon County, Utah.

COAL MEN

At Mine No. 24, Island Creek Coal Co., Ragland, W. Va., standing: W. C. Maynard (left), tipple foreman; R. C. Ison, section foreman; Raymond Yale, chief electrician; Joe Danish, mine foreman, and Frank Hunter, section foreman. Seated: Ralph Thompson (left), superintendent; J. J. Curry, section foreman, and Roscoe Kelley, section foreman.



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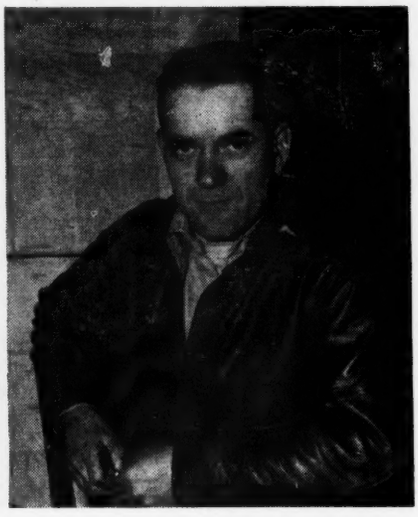

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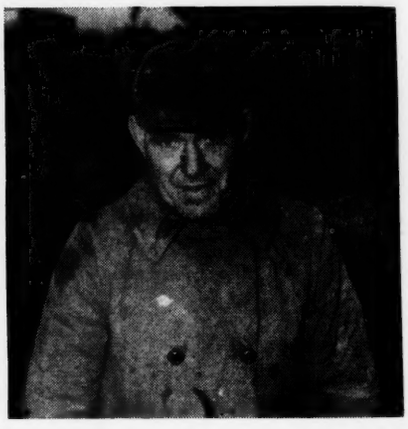

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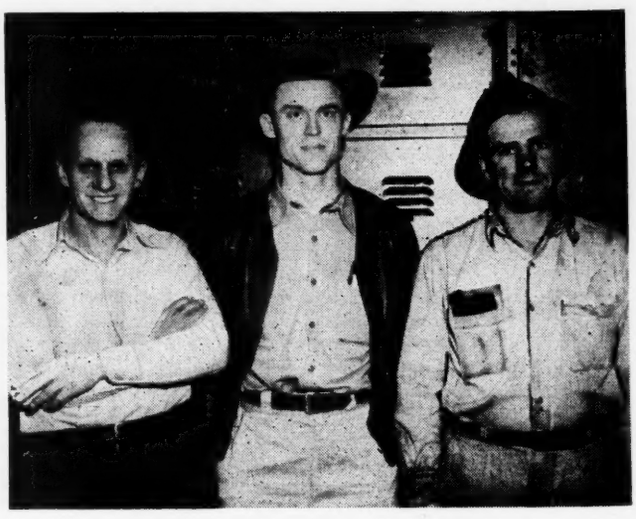

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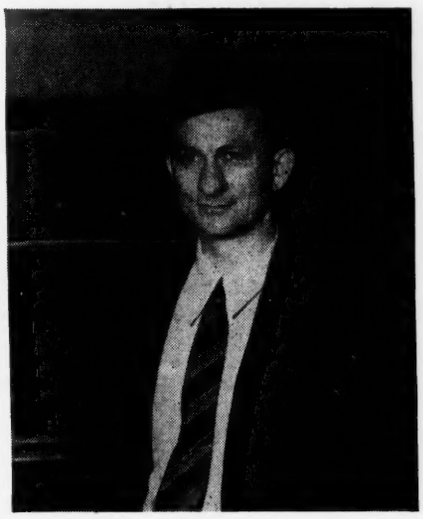

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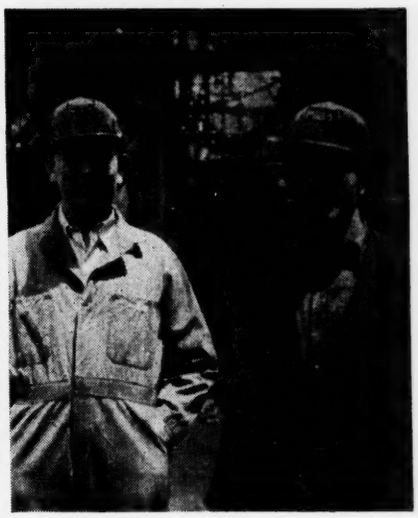

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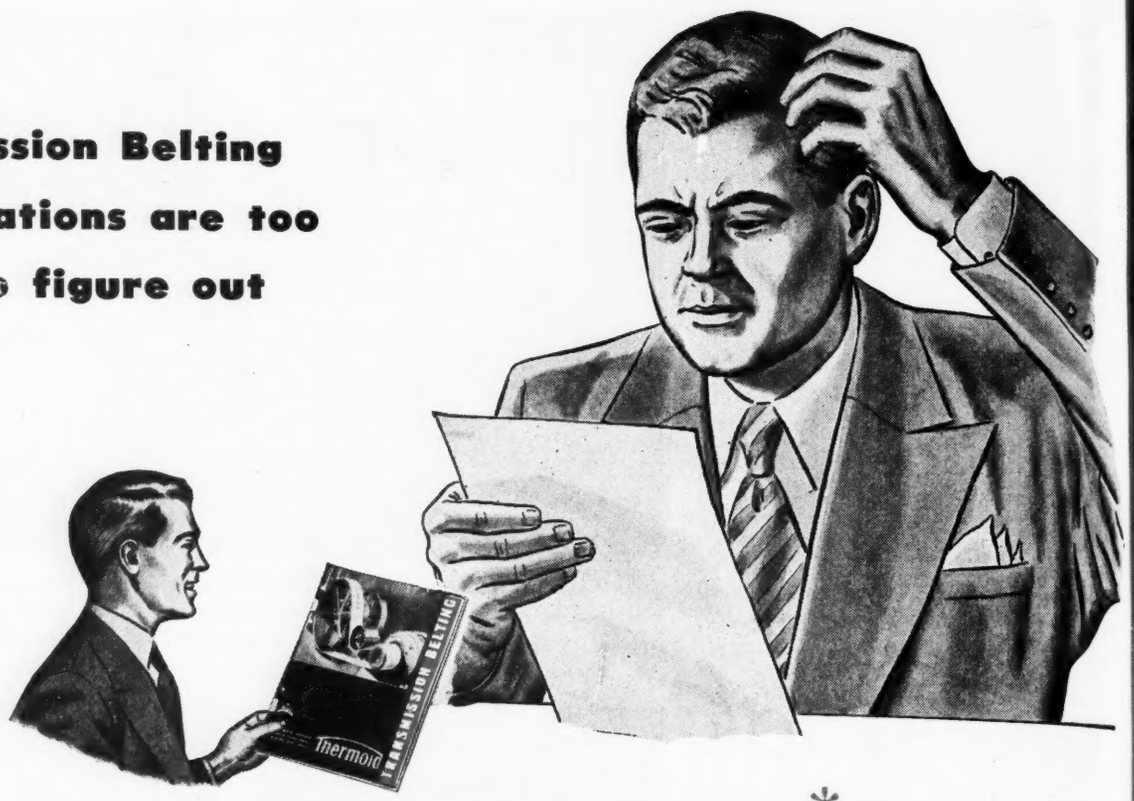

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News Round-Up

Lewis Asked to Stop Wildcat Strikes

Bituminous-coal operators last month were reported to have asked John L. Lewis to issue to U.M.W.A. members a clarification of the "able and willing to work" clause in the 1947 contract, in an effort to eliminate numerous "wildcat" stoppages that were costing coal production in various parts of the country. Such walkouts, often caused by the refusal of one man to work, had increased greatly since the contract was signed, it was said. One operator stated that there were 17 stoppages in the 50 mines in his area within six weeks.

While an immediate answer to the request was not received from Lewis, who was out of town at the time, local and district officials of the U.M.W.A. were so far cooperating fully in ending the stoppages, operators said.

•

New Developments

● A new strip mine expected to produce 2,000 tons daily is reportedly being opened near Marion, Ill., by the Morgan Coal Co., Indianapolis, Ind. The company is understood to have available about 1,400 acres of No. 5 seam coal and to plan erection of a tipple 1¼ miles east of the powder plant on the site of the old Carterville and Black Diamond mine. A coal-washing and preparation plant is to be constructed on a spur of the C. B. & Q. R. R., which is to be built to handle coal shipments. According to reports, the mine office is now under construction and a power shovel is opening the pit. A 12-yd. shovel is expected to be added during September. Charles Thomas, general superintendent for the company, is in charge of the new operation and is assisted by R. A. Smothers.

● Resumption of operations at the Bee-Veer mine of the Binkley Mining Co. of Missouri, Macon, Mo., recently acquired by the Sinclair Coal Co., under the name of the Bevier Coal Co., has been announced by C. W. Imlay, who continues as superintendent of the new organization. Supervisory personnel, Mr. Imlay said, would remain the same as under the Binkley management and former Binkley miners are being given preference in hiring by the new company. Between 90 and 100 men are to be employed.

● Reopening of the Luzerne colliery, Kingston, Pa., was expected momentarily, following signing July 26 of a lease on the former East Boston Coal Co. property by Mark J. Luksic of Luzerne, Pa. The mine, which was operated under lease for some years by Luzerne Anthracite, Inc., and employed 250 men, was closed down last November. A crew was to start immediately to clean up and retimber the mine and actual operations were to begin within several weeks. Mr. Luksic, who worked for East Boston and Luzerne Anthracite for 40 years and was mine foreman for the latter company when the mine was closed, said the mine will be a one-shift operation and that for the present the breaker would not be opened.

● Purchase by C. H. Sprague & Sons, Boston, Mass., of the Imperial Smokeless Coal Co., Welch, W. Va., was recently announced. The sale, according to reports, included 9,000 acres of coal lands, of which 7,000 acres is Sewell seam land, two mining operations in Nicholas County and one in Greenbrier County, 200 miners' homes and two company stores. Present production of the three mines is about 50,000 tons monthly.

● The Rochester & Pittsburgh Coal Co. is reportedly sinking a 380-ft. double-compartment shaft at its Big Ben mine, Twin Oaks, Cambria County, Pa. Completion of the shaft, under contract to the Williamson Construction Co., at a cost said to be about $200,000, is expected around Nov. 1.

● A new modern central machine shop, 50x100 ft., is under way at the Lancashire No. 15 mine of the Barnes & Tucker Co., Bakerton, Pa.

● The Crooked Creek Coal Co., recently incorporated in West Virginia, was expected to begin operations in Logan County, West Virginia, in September with an expected output of 600 to 700 tons daily, according to a statement by one of the incorporators.

● Stripping operations have been resumed at the property owned by the Corbin Mining Co. near Corbin, B. C., Can. The Corbin company has not operated the mine since the general strike of 1919, but the property has been worked intermittently up to a few years ago under a lease held by the Consolidated Mining & Smelting Co. of Canada, Ltd., with shipments going to their operations at Trail, B. C. For the present opration, which is producing about 1,000 tons daily shipped to Trail, Consolidated Mining & Smelting has sublet the contract for mining to the O'Sullivan Construction Co., of Lethbridge. Jack Barber is superintendent for the O'Sullivan company. The mine is located in Elk Valley in the Crow's Nest Pass, at an altitude of about 6,000 ft.

● Sale of the Buchanan County Coal Corp., operating four mines at Big Rock, Va., to the Ames Mining Co., Charleston, W. Va, was announced early last month by the Vera Pocohontas Coal Co., Welch, W. Va., Buchanan's parent company. According to reports, the sale includes acreage in the Clintwood coal seam, 50 houses, two company stores and two tipples. Production of the four mines is approximately 50,000 tons monthly. The sale by Vera Pocahontas of the Imperial Smokeless Coal Co. to C. H. Sprague & Sons was previously announced.

● Formation of the Peters Creek Coal Co. and the opening of a stripping operation near Swiss, Nicholas County, W. Va., was announced last month by James D. Ireland, vice president in charge of operations for the Cameo Coal Mining Co., who is president of the new company. The Upper Banner seam is to be stripped and an initial capacity of 1,000 tons daily is being planned, with a possible further expansion later. A tipple is being erected and coal will be shipped, crushed and mine-run, via the N. Y. Central R. R., with a 30-car-capacity side track provided.

● Plans for a 750-t.p.h. coal-preparation plant at Price, Ky., were announced last month by the Inland Steel Co., Wheelwright, Ky. The plant, which will be located on the Beaver Creek branch of the C. & O. about eight miles from Wheelwright, is reportedly described as "the most complete coal-cleaning plant yet designed or built." Its operation is expected to eliminate hand picking now carried on at the face and permit a greater use of mechanical mining in the 29,000-acre property being mined by Inland. Initial operation of the plant is not expected for 26 months. It is understood that the Link Belt Co., Chicago, will engineer and construct the plant, and that coal will be transported underground direct to the plant through a 5-mile haulageway.

● The new tipple under construction for some time at the Derifield mine

Business and Industrial Activity

		1947 to This Date	1947 Over 1946 to Date
Anthracite prod., July, 1947, net tons	4,091,000	31,890,000	— 8.8%
Est. bituminous prod., wk. end. Aug. 16, 1947	11,740,000	378,218,000	+ 19.3%
Domestic sales, stokers, May, 1947	5,133	17,697	— 72.8%
Domestic sales, oil burners, May, 1947	89,718	408,272	+210.2%

	Week End. Aug. 16	Month Ago	Year Ago
Business Week Index of Business Activity	190.2	189.7	183.1
Steel ingot operations (% of capacity)	92.8	93.1	89.7
Electric power output (million kw.-hr.)	4,932	4,732	4,422
Crude oil prod. (daily avg., 1,000 bbl.)	5,159	5,050	4,843
Misc. & L.C.L. carloadings (daily avg., 1,000 cars)	84	80	84
All other carloadings (daily avg., 1,000 cars)	67	55	65
Prices, spot commodity index (Moody's, Dec. 31, 1931 = 100)	421.4	418.7	348.5
Prices, industrial raw materials (B.L.S., Aug., 1939 = 100)	268.3	267.3	202.9
Prices, domestic farm products (B.L.S., Aug., 1939 = 100)	374.5	375.3	308.4
Prices, finished steel composite (*Steel*, ton)	$75.41	$69.82	$64.45
90 Stocks, price index (Standard & Poor's Corp.)	122.9	125.8	141.8

of the American Coal Co. of Alleghany County, McComas, W. Va., is understood to be nearing completion and is expected to be in full operation this fall. It will handle 20,000 tons weekly.

• Extensive development of the southern coal field of Fremont County, Colorado, is being planned, following a report that the W. D. Corley Co., Colorado Springs, had purchased the old Santa Fe R.R. spur from Rockvale to Radiant and would extend it into the Newlin Creek district south of Florence to serve the 17 coal mines in that area. The 4½-mile spur has not been used since 1932 and the cost of putting it into operation and constructing the new line 2.6 miles long is estimated at $40,000 to $50,000. Mines in the district may have trackage built to them, according to W. D. Corley Jr., head of the company. The Corley company also was reported expanding the operation of its mine near Florence. A new steel tipple is being built and new equipment is to be installed, with an increase of employees contemplated.

• Opening of a new slope mine, which is expected to employ between 100 and 150 men, was announced last month by the Stump-Allen Coal Co., Marion, Ill. The company has 280 acres of coal land available and the mine is expected to produce 3,000,000 tons of coal. C. C. Stump is president of the company, his son, John C. Stump, is vice president, and Bert O. Allen is secretary-treasurer.

• Purchase of the former Black Diamond breaker at Luzerne, Pa., and the resumption of its operation, was recently announced by Sam Capone, president, Capone Coal Co., Plains, Pa. Present capacity is about 500 tons daily and plans are being made to enlarge the capacity and install improved equipment. The Fuel Distributing Corp., New York, has been appointed exclusive sales agent for the coal.

• An agreement between the Pennsylvania Electric Co. and the Blair Engineering & Supply Co., a subsidiary, has been reported, under which Blair furnishes the operating personnel, exclusive of supervisory employees, for Penelec's No. 5 mine at Seward. W. C. Sontum, vice president of Blair Engineering & Supply Co., has assumed operation of Blair's Midlothian mine, in addition to Penelec's No. 5 mine, and both mines are under the supervision of M. J. Ackerman, general superintendent of mines for Penelec. At an organizational meeting held in May, the following officers and directors were elected for the Blair company: D. W. Jardine, president and director; W. C. Sontum, vice president and director; W. H. Wade, vice president and director; R. F. Pruner, secretary-treasurer; H. G. Stevens, assistant secretary; R. A. Gallagher and B. M. Kirsch, directors; and P. R. Lawson, comptroller.

• Plans for the expansion of the company's stripping operations in the Kimberly, Ohio, area were recently reported by E. A. Cottingham, general superintendent, Hocking Valley Mining Co., in announcing the closing of the firm's deep mine at Kimberly. The mine, which had employed about 100 miners and produced about 500 tons daily, was closed because of depletion of the coal, according to reports. The company will continue to operate its deep mines at Hocking and Lost Run.

•

President Signs Mine Inspection Bill

President Truman Aug. 4 signed into law a modified bituminous coal mine inspection bill introduced by Sen. Butler, and passed by the House in the closing days of the session. In its final form, the act does not provide for police powers, but does require prompt reporting of inspections made.

Under the bill's provisions, if the director of the U. S. Bureau of Mines finds on inspection that the safety standards of the Federal Safety Code are not being followed, he is to immediately notify the owner and operator of the mine and the state agency charged with safety enforcement in the mine of the findings and recommendations and to request the owner, operator and state agency to report the action taken.

The Secretary of Interior, acting through the director of the bureau, is required by the bill to report to Congress every three months on the conditions of all bituminous and lignite mines inspected during the period the recommendations and notices to the state agencies, and the action taken by owners, operators and state agencies with respect to the recommendations made. The records of inspections, findings, notices, etc. are to be made available to public inspection as soon as possible.

Anticipated expenditures for rescue stations and coal-mine inspections were two of only a few major items in the U. S. Bureau of Mines budget that were fully approved by the Congress, as it sought to cut budget figures all along the line. The final bill allowed $1,148,000 for rescue stations and $1,625,000 for coal-mine inspections. $125,000 of the Bureau's allotment for coal statistics was put back in the appropriation bill by the Senate after the House had removed all the $200,000 asked by the bureau for this purpose.

•

Rock Hurled by Strip Blast Kills Boy

A 10-lb. rock reportedly thrown some 1,500 ft. during blasting operations in an anthracite strip pit in Luzerne County, Pennsylvania, struck and killed a 16-year-old boy on Aug. 5 and resulted in a formal charge of involuntary manslaughter against George Kaminski, one of the firm of Kaminski Bros. Coal Co., three days later. Mr. Kaminski waived hearing before Justice of the Peace W. H. Evans, Wyoming, Pa., while authorities debated whether to undertake a grand-jury investigation of the incident.

•

W. Va. Group Provides For Mining Scholarships

A series of West Virginia University scholarships in coal-mining engineering totaling $5,000 a year for each of the next five years, have been provided by the West Virginia Coal Association, Irvin Stewart, president of the University, recently announced.

President Stewart said details of the awards were worked out by university representatives and L. Ebersole Gaines, Mt. Hope, W. Va., president of the coal association. For 1947, there will be eight scholarships, each of $625 to be paid in nine monthly installments during the school year.

In commenting on the grants, Mr. Gaines said: "Our plan to provide $5,000 annually for mining-engineering scholarships at West Virginia University," said Mr. Gaines, "is to

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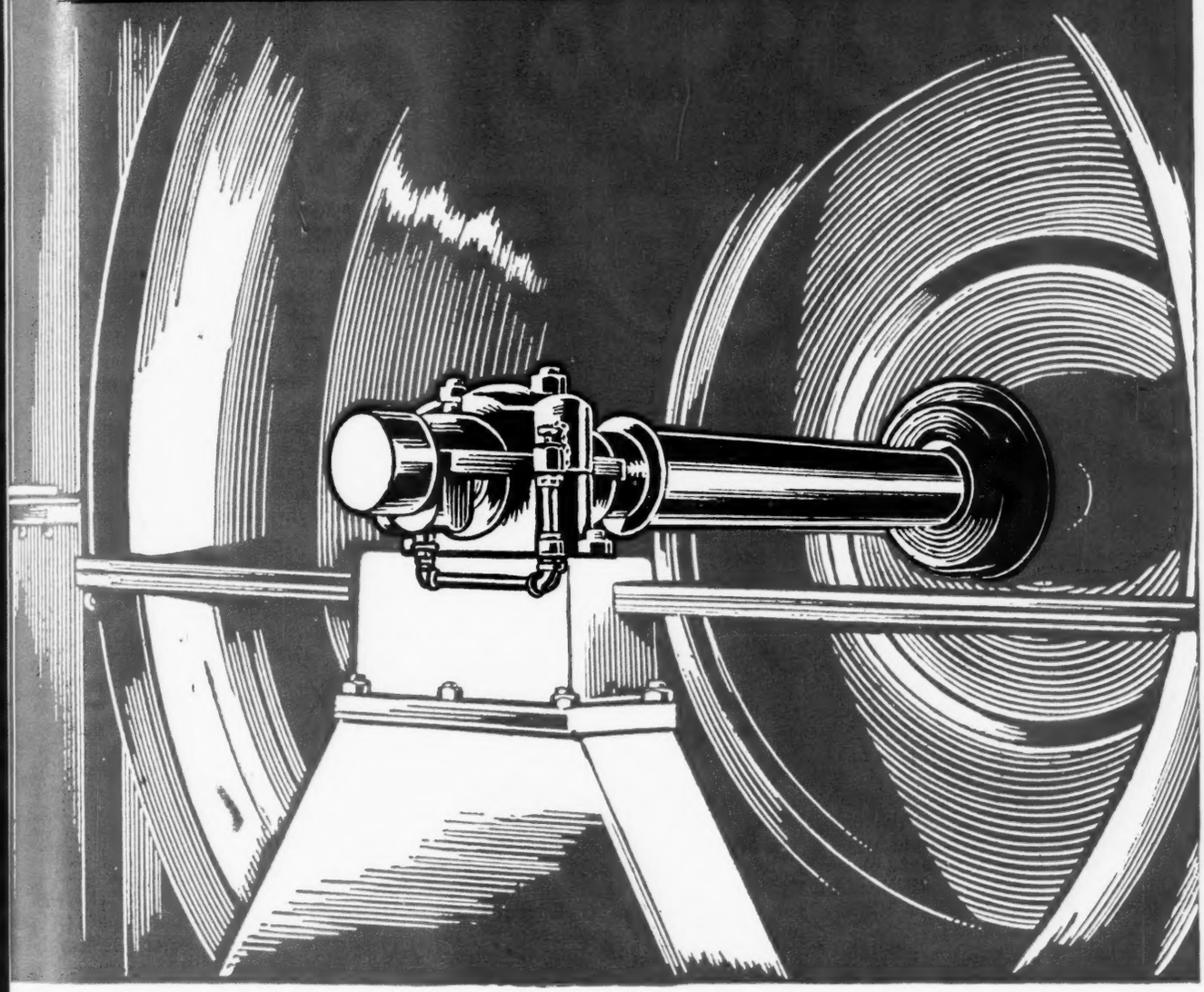

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attract worthy high school graduates into the coal industry and to aid them in obtaining higher education to fit themselves for leadership in the industry upon which the whole state is dependent.

"Coal has the triple distinction of being the largest wage-payer, the largest taxpayer and the largest labor-employing industry in West Virginia, which has led the nation continuously since 1931 as the largest producer of bituminous coal. We feel it incumbent that our association provide the means to help our young men to prepare themselves to lead the industry in future years."

During the five-year period, the awards will be made to residents of West Virginia only. Applicants must not have reached their 21st birthdays at the time the applications are submitted unless they are then enrolled in an accredited university or college, in which case the age limit is 23. All applicants must submit written evidence from a physician that they are physically fit to enter mines and to perform the duties of a mining engineer, supervisor or manager.

Recipients of the scholarships will be selected by the University Board of Governors upon the recommendation of the faculty of the School of Mines on the following basis: (1) scholarship, (2) extra-curricular activities, (3) personality and (4) aptitude for scientific and engineering work as demonstrated by special qualifying tests to be provided by the School of Mines. Nominations may be made by the coal association or any of its members, by any coal-mine superintendent, high-school principal or teacher or by any graduating high-school senior or recent graduate placing himself in nomination. All should be addressed to the School of Mines, West Virginia University.

The scholarships will be administered and supervised by the University. The coal association, however, will appoint an advisory committee, which will be available to consult with the University and to assist in locating summer employment for the scholarship holders if necessary.

•

Strikes Hit Mines In Several Fields

Striking against shift rotation and starting time, company pay policies, subcontracting and layoffs, miners in scattered operations in Kentucky, West Virginia, Virginia and Ohio walked off their jobs in July and August for periods up to a week and more.

In Kentucky, 2,000 miners returned to work Aug. 11 at the Consolidation Coal Co.'s pits in Letcher County after a one-week strike, when the company agreed to restore seniority rights on shift assignments. Earlier, on July 26, some 1,500 men at the company's properties had been idled by a walkout of 25 workers at the central preparation plant, which serves three nearby mines. Meanwhile, near Whitesburg, a shutdown of nearly 400 truck-mine operators employing about 6,000 miners entered its second week as the Letcher County Truck-Mine Operators' Association sought a larger percentage of the sale price of coal they mined.

In West Virginia, 130 men employed by the Margaret Coal Co., Greenbrier County, staged a walkout Aug. 1 to protest the subcontracting of certain stripping and other work in alleged violation of the new wage contract and 600 miners employed by Eastern Gas and Fuel Associates in Raleigh County stopped work July 28 in a dispute over the starting time for certain shifts. At Edwight, approximately 500 employees of the Raleigh-Wyoming Mining Co. struck July 26 to protest the company's action in denying machine operators an extra 30 minutes' pay daily for greasing their equipment.

In Ohio, 145 workers at the David Z. Norton Co.'s mine at Crescent walked out late in July to protest the layoff of a 10-man loading crew. Reason for the layoff was said to be a power shortage. In Virginia, a three-way dispute beginning July 28 idled 250 men at the Peerless Coal Corp.'s mine near Wise, when miners refused to work in protest against unorganized stripping operations on land leased to a contracting firm.

MEETINGS

- National Safety Congress and Exposition: Oct. 6-10, Stevens and Sherman Hotels, Chicago.
- New River Coal Operators' Association: annual meeting, Oct. 9, Mt. Hope, W. Va.
- National Coal Association: convention, Oct. 16-18, LaSalle Hotel, Chicago.
- Fuels Conference of Coal Division, A.I.M.E., and Fuels Division, A.S.M.E.: Oct. 20-22, Hotel Gibson, Cincinnati.
- Illinois Mining Institute: annual meeting, Oct. 31, Hotel Abraham Lincoln, Springfield, Ohio.
- Central Appalachian Section, A.I.M.E.: annual meeting, Dec. 12-13, Greenbrier Hotel, White Sulphur Springs, W. Va.

•

Holmes Safety Picnic Well Attended in Pa.

"To make the mines in Pennsylvania the safest in the world," was the objective adopted at the business session of the annual picnic of the Ebensburg (Pa.) Council of the Joseph A. Holmes Safety Association held Aug. 16 at Nicktown. Among the more than 400 attending were representatives from federal and state mining bureaus, coal companies and the U.M.W.A. Official adoption of the objective was said to mark the beginning of a program to increase the safety consciousness of the industry in the district.

•

First Aid Meet Held In Anthracite Region

Following a lapse of five years because of the war, the annual first-aid meet sponsored by the independent operators of the Middle and Southern Anthracite Fields were resumed Aug. 9 with the 1947 meet held at Lakewood Park near Mahanoy City, Pa. The meet, designed to stimulate interest in mine rescue work and training, was sponsored by 43 mining companies and promoted by the Pennsylvania Department of Mines in cooperation with the U. S. Bureau of Mines and the U.M.W.A. More than 2,500 people attended the event, in which 23 first-aid teams competed.

•

British Report on German Coal Cleaning

A German electrostatic process for cleaning coal that reduces the ash content to one-tenth the original amount is described in a British report on electrostatic separation of coal and other minerals recently made available by the Office of Technical Services, U. S. Department of Commerce. Under optimum conditions, a local German coal containing 23-percent volatile matter was cleaned with a reduction from 14- to 17-percent ash to 1.5-percent ash in the processed coal.

The Germans have operated a pilot plant for the electrostatic cleaning of coal with a capacity of about 1½ t.p.h. at the Osterfeld colliery at the Gutenhoffnungshutte. A second plant designed for a capacity of 10 t.p.h. was erected at a mine at Essen but did not go into production because of bomb damage.

The principal advantage of cleaning fine coal by the method is that the separation takes place in the dry state, avoiding all wet working and sludge treatment. The report states that the low power and labor costs for the operation of the separators also are attractive features of the process.

The report, PB-75865, "Electrostatic Separation of Coal and Other Minerals," totals 70 pages and contains tables, photographs, graphs and drawings. It may be ordered (microfilm, $2; photostat, $5) from the Office of Technical Services, Dept. of Commerce, Washington 25, D. C., and orders should be accompanied by check or money order payable to the Treasurer of the United States.

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LASTS LONGER

J. A. HAGY (LEFT), chairman of the Central Appalachian Section, A.I.M.E., B. H. Mott, president, Mott Core Drilling Co., M. D. Cooper, director of vocational training, National Coal Association, and Frank J. Forsyth, district electrical mine inspector, Pikeville, Ky. Mr. Hagy presided; the others presented papers.

SIMEON WILLIS, Governor of Kentucky, speaking at the Lexington dinner. Along the near end of the speakers table are: Charles T. Holland (left), secretary-treasurer; Charles E. Lawall, head, coal development department, C. & O. Ry.; Veleair C. Smith, consulting engineer and geologist; and J. A. Hagy, chairman of the section.

Central Appalachian Section Meets

DRILLING large-diameter boreholes for ventilation escapeways, making mining more attractive to young technical graduates and the grounding of electrical equipment were subjects at the mid-year meeting of the Central Appalachian Section, American Institute of Mining and Metallurgical Engineers, Phoenix Hotel, Lexington, Ky., July 25-26. On Saturday morning after the last session a group visited the low-temperature carbonization plant at the University of Kentucky.

James A. Hagy, superintendent, No. 1 mine, Jewell Ridge Coal Corp., Jewell Ridge, Va., and section chairman, presided at the technical sessions. L. I. Cothern, head, department of mining engineering, Virgina Polytechnic Institute, was toastmaster at the dinner, at which Simeon Willis, Governor of Kentucky, was the speaker. The annual meeting will be held at the Greenbrier Hotel, White Sulphur Springs, W. Va., Dec. 12 and 13.

Boring a 72-in.-diameter hole is under consideration by the Mott Core Drilling Co., said B. H. Mott, president. He showed schematic sketches of equipment to do the job and of a proposed system of multiple cages, one above the other, for use in hoisting men through boreholes. Number of cages is limited by depth of the hole below the mine level and height of the headframe at the surface.

In drilling holes of this large diameter, the power and control station and the drilling barrel are handled on a wire rope. A man is stationed in the power cage which is close above the drilling barrel. Dogs forced against the sides of the hole hold the power unit from turning and allow pressure to be exerted against the drilling barrel. Chilled shot imbedded in a mild-steel bit is the boring medium and the cuttings are accumulated in a settling tank in the drilling barrel. Cores as large as 72 in. will likely be drilled, shot and mucked instead of being broken and hoisted as in holes of 36 to 48 in.

In drilling holes of 3- to 4-ft. range, cores are broken by wedging. The hoisting may be done by a special core lifter or by an eye bolt attached by a man going down into the borehole and drilling a hole in the center of the core with a jackhammer. In drilling a 4-ft. hole, a core of 4 ft. in length is about the maximum size it is practical to hoist at one time. Up to this time the Mott Core Drilling Co. has used only the drill rod method for the 3- to 4-ft. holes it has bored.

Pre-grouting to control water is usually advisable in drilling large-diameter boreholes as in sinking conventional shafts. The character of the strata is first determined by boring a small hole and hydrostatic tests made to determine the amount of grout that the water-bearing porous sections will take. One hole is usually sufficient for pre-grouting a borehole of 36 to 48 in. in diameter. Some customers, Mr. Mott said, are willing to pay separately for a test hole before asking bids on the large bore.

He mentioned three uses for large-diameter boreholes: for ventilation, as manways and, possibly, for transportation of coal. Among the data and information he presented in answering questions were the following: existing conventional mine shafts can be grouted to shut off water, but it may be a long and difficult job and as an example he described a case where it took six months work to dry up a 30-year-old shaft. Unless grouting pressures were held initially to four or five lb. per square inch, the old rotten concrete lining walls were pushed out into the shaft.

Holes as large as 10 ft. in diameter may be bored some day and the cores of these will be drilled, shot and mucked out. A hole can be drilled straight if time is taken and excessive pressure is not put on the bit. As a contractor, Mr. Mott said that he figures on averaging 2½ ft. per day in drilling a 36-in. Twelve- to 16-in. holes are about the maximum size in which diamond bits are used. Costs of 36-in. holes run approximately $40 to $42 per vertical foot if it is to be a five to six-hole job and totals around 1,000 ft. of drilling. Pre-grouting brings the total cost to about $50 per foot. Caving sections of a hole must be filled with materials such as bentonite and then cased.

Fifteen years ago, when pre-grouting was in its infancy, tremendous quantities of grout were pumped in. In one case it was found that the grout traveled about 1½ miles. Now, by use of chemicals and various methods the job is done with a relatively small amount of grout.

For pre-grouting an ordinary mine shaft, one hole may possibly suffice, but more likely it will require a pattern of three or more, perhaps five, seven or nine. In Minnesota 5- to 6-ft.-diameter boreholes have been drilled, to a maximum of 1,200 ft.

Veleair C. Smith, consulting engineer and geologist, Charleston, W. Va., told of experiments that have been made with a critical-temperature setting plastic, which can be pumped into the hole in a clear liquid state to force back the water front and which will set to a solid at an instant predetermined by time and temperature. This sealing by the plastic is followed by low-pressure grout and then by the usual high pressure.

Professor Cothern said that for mine ventilation 6-ft. boreholes would

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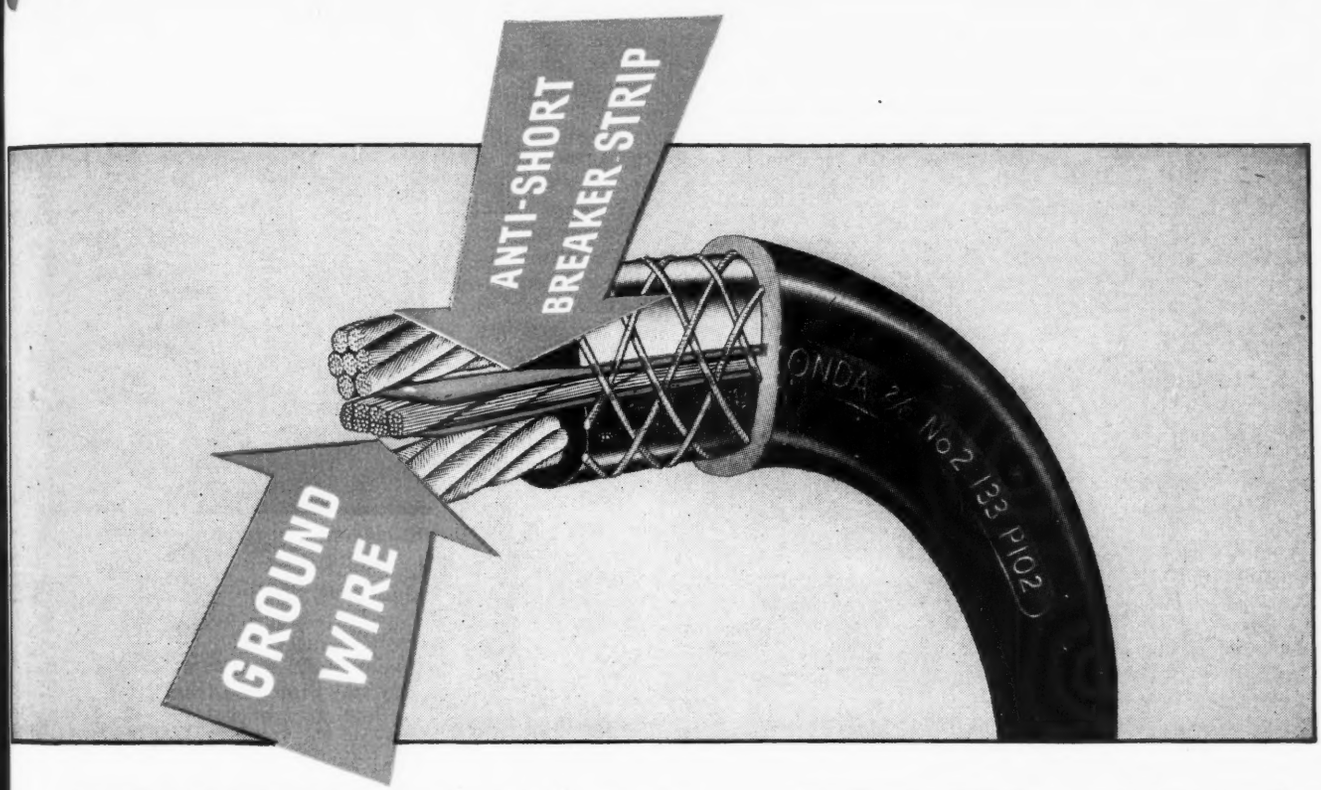

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EQUIPMENT APPROVALS

Three approvals of permissible equipment were issued by the U. S. Bureau of Mines in July, as follows:

Joy Mfg. Co., Sullivan Division—Type CD22 hydraulically operated coal drill; one pump motor, 26-hp., 250- and 500-volts d.c.; Approvals 582 and 582A, respectively; July 15.

Ingersoll-Rand Co.—Type F15NM-2F scraper hoist with double drum; one motor, 15-hp., 230-volts, d.c.; Approval 583; July 15.

Joy Mfg. Co.—Type 7BU-14E loader; one motor, 35-hp., 250-volts d.c.; Approval 584; July 25.

be indicated. Their practicability, however, compared to shafts sunk by usual methods, cannot be determined until costs of boreholes are known.

Young technical graduates coming into the coal industry, said M. D. Cooper, director of vocational training, National Coal Association, should be assured good income, steady employment for a reasonable length of time and good living conditions. A good foundation of practical work should be given at the beginning and the man should be moved through the various departments. There should be opportunities to advance as capabilities increase.

Prefacing his talk on how to make mining attractive to the young technical graduate, he said that now, while the coal business is good, is the time to make the most of it. The industry should be made known to teachers and students in the high schools. Most of these students, as contrasted to college students, live at home and will discuss what they hear with their parents. The mining industry is on the defensive because the public knows too little about it.

Mr. Cooper believes the coal industry has a responsibility in giving the young graduates an opportunity to learn. He suggests a two-year "apprentice" period under the eye of some official who will see that the young man is moved through different departments. The rise in value of coal calls for greater planning to avoid waste. It is time that young men be trained to do a better job safely. In visiting colleges, Mr. Cooper said, he finds a trend toward more of the mental sciences in the mining-engineering courses and he thinks that is good if not carried too far.

Professor Cothern said that only about one percent of the returned servicemen now in college are taking mining engineering. He was gratified that a trip into workings in a 36-in. coal seam did not scare out students of a V.P.I. senior class who were taken on a week trip through mechanized mines and were purposely taken into the thinner seams first.

Charles T. Holland, professor of mining engineering, West Virginia University, said that since about 1924 there have been more calls for mining engineers at West Virginia than there have been graduates available.

Questioned after reading a paper, "Grounding of Underground Electrical Equipment," Frank J. Forsyth, district electrical mine inspector, Pikeville, Ky., agreed with Professor Cothern that: (1) frame grounding lessens the frequency of shock, (2) frame grounding increases the explosion hazard and (3) frame grounding increases the severity of a shock by contact between the case and live conductors or a live part insulated from the case.

Mr. Forsyth presented data from a study of 95 electrocutions that have occurred in Kentucky coal mines in the past 13 years. Percentages and the causes are as follows: 2, live cutting-machine frame; 4, hand drills; 75, trolley voltage; 2, 110-volts; 6, 220-volt three-phase; 6, high voltage; and 5, miscellaneous. Calling attention to the few electrocutions on cutting-machine frames and pointing out the number is no greater than for 110 volts, he questioned the use of time and energy trying to overcome a danger that barely exists.

With a "Triplet" ohmmeter Mr. Forsyth demonstrated how degree or character of contact with the body influences the chances of getting a body circuit of less than 40,000-ohms resistance, which is the dangerously low margin in 300-volts d.c. He said the average workman will detect shock at 12 volts and with good contact will lose use of the muscles at 50 volts. The 40,000 ohms at 300 volts is based on observations that 0.008 to 0.01 amp. can be stood without losing muscular control.

A good ground was defined as one of less than 10-ohms resistance. The simple ground to earth, without a good metallic path clear back to the power source, may set up stray currents that may be dangerous to blasting.

Fearing that complicated but technically suitable grounding systems might not be maintained properly, Mr. Forsyth suggested simple devices such as a neon lamp or an ohmmeter installed permanently on a machine to indicate condition of insulation. He said hazards from live machine frames are greatly minimized by use of protective clothing including suitable shoes and gloves.

E. R. Price, general superintendent of mines, Inland Steel Co., said that since grounding does lessen the frequency of shock, it should be carried out and then ways he worked out to overcome the objections of increased explosion hazard and shock severity.

J. H. Edwards, associate editor, *Coal Age*, said that problems of grounding shortwall cutters that make good contact to the mine bottom and grounding shuttle cars that have no metallic connection to ground are quite different and should be treated separately.

Personal Notes

Promotion of three top operating officials has been announced by the Hanna Coal Co., St. Clairsville, Ohio. **James Hyslop**, formerly vice president in charge of operations, has been named executive vice president of the organization. Production at the Hanna mines has jumped from 3,000,000 to 6,500,000 tons yearly during the time Mr. Hyslop has been in charge of operations, it was reported.

James Hyslop

James D. Reilly, general manager of underground mines, has been named to succeed Mr. Hyslop as vice president in charge of operations. Mr. Reilly was promoted from mine superintendent to general superintendent of Piney Fork No. 1 and Dun Glen No. 11 mines in 1945 and was made general manager of underground mines late last year. **Norman Prudent**, formerly production engineer, has succeeded Mr. Reilly.

Lee M. Morris, head, department of Mining and Geology, West Virginia Institute of Technology, Montgomery, W. Va., has resigned, effective Sept. 1, to become assistant to the president, Warner Collieries Co., Cleveland, Ohio.

The Hudson Coal Co., Scranton, Pa., has announced several changes in supervisory personnel. **Clement R. Maher**, formerly fireboss at Eddy Creek colliery, has been appointed section foreman at Marvine colliery. **John B. Ramik**, student, has been advanced to fireboss at Eddy Creek colliery. **James J. Beyer**, fireboss at Pine Ridge colliery, has been made section foreman at Delaware colliery and **George Thompson**, formerly company miner at Delaware, has been appointed fireboss at Pine Ridge.

Dr. Arthur C. Bevan, Virginia State Geologist, Charlottesville, Va., will become, effective Sept. 15, principal geologist in charge of the geological

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Dr. Charles J. Potter

W. D. McElroy

resources section of the Illinois Geological Survey, Urbana, Ill., succeeding **Dr. Ralph E. Grim**, who has requested relief from administrative duties to devote more time to the survey's research program on clay minerals. Dr. Bevan will retain his chairmanship of the Division of Geology and Geography of the National Research Council.

Theron G. Gerow, vice president, has been named executive vice president of the Truax-Traer Coal Co., Chicago. Mr. Gerow first joined the company in 1927, as an engineer in its North Dakota division. In 1930 he became superintendent of the Wilton mine, a position he held until 1935 when he came to Illinois to superintend development of the Fiatt mine. He was named chief engineer later that year and was made vice president in 1941.

Dr. Charles J. Potter, assistant to the president of the Rochester & Pittsburgh Coal Co., Indiana, Pa., has been appointed vice president in charge of operations, succeeding **George L. Smith**, retired. From 1941 until his return to Rochester & Pittsburgh in November, 1945, Dr. Potter was active in the operation and administration of the Solid Fuels Administration and its predecessor agency. He served as deputy administrator of the organization from 1943 until his return to industry. On May 9, 1946, Dr. Potter was presented by Secretary of the Interior Krug with the Medal of Merit awarded him by President Truman for his outstanding wartime service (*Coal Age*, June, 1946, p. 132).

W. D. McElroy has been appointed manager of the development department of the research and development division of the Pittsburgh Consolidation Coal Co., Library, Pa. A graduate of West Virginia University, Mr. McElroy has been associated with the United Gas Improvement Co., Philadelphia, for the past 19 years, the last seven years of which he was general superintendent of the company's Ugite Plant No. 2. In his new position Mr. McElroy will be in charge of all pilot-plant operations in Pittsburgh Consolidation's coal-gasification program.

L. H. Gibbs Jr., president of the Diamond D Coal Co. and the Boynton Coal Co., Somerset, Pa., has been named president of the Manion Coal Corp., operator of the Spangler No. 3 mine in Cambria County. Extensive improvements are reported being planned for the mine.

S. H. Clarke, formerly assistant general manager, has been elected president and general manager, Roundup Coal Mining Co., Roundup, Mont.

W. E. Wheeler, assistant general manager, Eastern Coal Corp., Stone, Ky., has been promoted to general superintendent, Premier Pocahontas Collieries Co., with headquarters at Premier, W. Va. Mr. Wheeler has had extensive coal mining experience and before joining the Eastern Coal organization was senior mine inspector for the Kentucky State mine department. G. Lawrence Runyon, formerly general superintendent of Premier Pocahontas, has joined the staff of the Eastern Coal Sales Co. as a field representative.

A. C. Bryant, formerly mine foreman for the New River Co., at Stanaford, W. Va., has been appointed superintendent for the Maryland Fire Creek Coal Co., Terry, W. Va.

Lee Wilson, assistant mine foreman, Gauley No. 2 mine, Elk Lick Coal Co., Webster County, West Virginia, has been appointed general mine foreman, succeeding **Allen Rasnick**, resigned. At the company's No. 3 mine, **Forrest Given** recently named assistant mine foreman, has been advanced to general mine foreman, replacing **E. S. Buzzard Jr.**, who has been made mine examiner for both mines. **Glen Hunt** has been appointed assistant mine electrician at Mine No. 3.

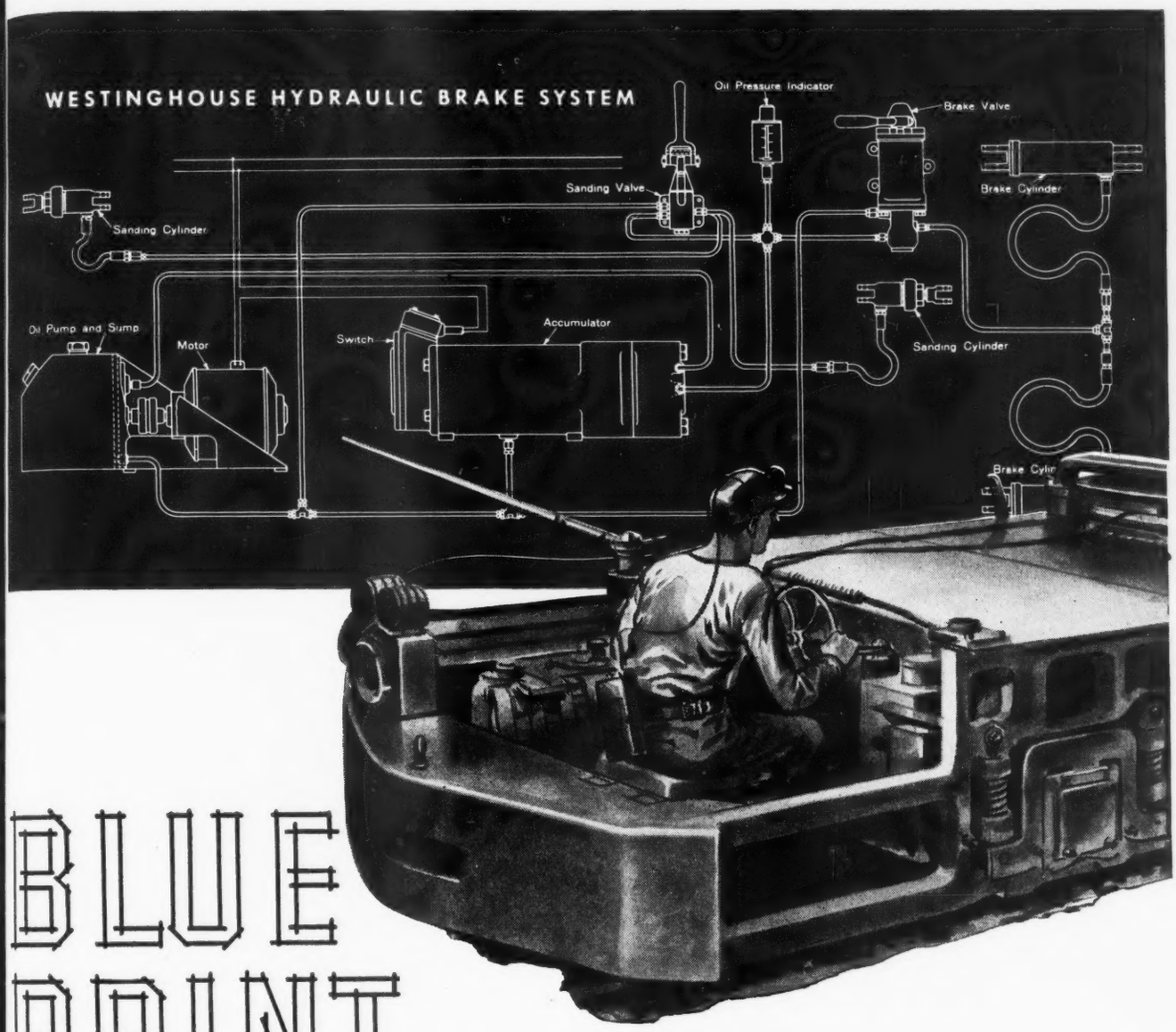
John Deery, formerly mechanical engineer, has been appointed chief engineer, West Virginia Coal & Coke Corp., Omar, W. Va., succeeding **W. S. Gentry**, resigned. Mr. Deery, a graduate of the Missouri School of Mines and Metallurgy, has been a member of the company's engineering department since 1940.

W. E. Flanary Sr., a member of the engineering department and associated for the past 26 years with the Island Creek Coal Co., Holden, W. Va., has resigned to join the Jones & Laughlin Steel Corp. as superintendent of construction at California, Pa.

Max H. Forester, head of the American military government's coal section in Germany, is reportedly planning to return to his previous job as vice president of Pittsburgh Consolidation Coal Co. sometime this fall. Mr. Forester, who has been in Germany more than a year, recently has been in Washington, serving as technical advisor to the United States delegation at the Ruhr coal talks.

W. P. Tams Jr., Gulf Smokeless Coal Co., Tams, W. Va., has been elected to the board of directors of the W. M. Ritter Lumber Co., Red Jacket Coal Corp. and Red Jacket Coal Sales Co.

Robert E. Mitchell, formerly general night foreman, has been appointed general mine foreman, Keystone mine, Coal Division, Eastern Gas & Fuel Associates, Keystone, W. Va., succeeding **C. J. Kirby**, now a member of the accident-prevention department. **Lowell Shrewsbeyyr** has been made safety inspector at Keystone and **Paul St. Clair** is now general night foreman. **A. F. Pennington**, general mine foreman, for the past five years at the company's Carswell mine, Kimball, W. Va., has been named division inspector, working



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under the general superintendent. He has been succeeded by **Terry Chandoha,** formerly assistant general mine foreman.

John M. Johnson, vice president in charge of operations, Zeigler Nos. 1 & 2 mines, Bell & Zoller Coal & Mining Co., Zeigler, Ill., has retired because of ill health. He is reportedly planning to live in Pennsylvania.

James L. Hoban, Big Mine Run, Pa., has been appointed a federal mine inspector in the Johnstown district. Before his appointment July 31, he was a fireboss at the Locust Gap colliery of the Philadelphia & Reading Coal & Iron Co. and had been with P. & R. for 24 years.

Stuart Colnon has been elected president, Freeman Coal Mining Corp., Chicago, succeeding **J. Roy Browning** who has joined the Illinois Coal Operators' Association. **Frank Nugent,** formerly vice president in charge of sales, has been named executive vice president of the company. Mr. Colnon has been vice president of the Material Service Corp. and served overseas for 2½ years as a lieutenant colonel with army engineers.

John S. Wells, superintendent, Maitland mine, Coal Division, Eastern Gas & Fuel Associates, Maitland, W. Va., has been named general superintendent of the company's new mine at Wharton, W. Va., recently announced (*Coal Age,* August, p. 120). **E. B. Taylor,** from the company's Pittsburgh office, replaces Mr. Wells at Maitland.

Grant F. Hall, Blackmont, Bell County, Ky., has been appointed a Kentucky district mine inspector.

Harold L. Walker, acting director of the Illinois State Department of Mines and Minerals, was expected to return Sept. 1 to the University of Illinois in his former position as professor of mining and metallurgical engineering. Mr. Walker was named to the state post following the resignation of Robert Medill last spring.

A. G. Gossard, a superintendent for the Pittsburgh Consolidation Coal Co., has been named general superintendent, Union Colliery Co., Dowell, Ill., succeeding **John Harvey,** acting superintendent since the retirement of Edward A. Leming, who resumes his position as construction superintendent at the New Kathleen mine.

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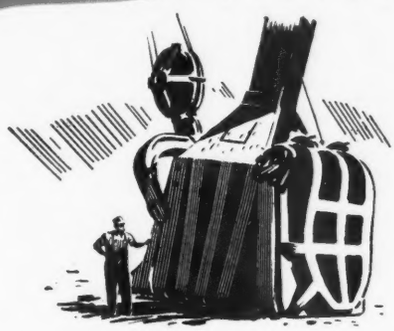
Association Activities

Anthracite Section, A.I.M.E., at its annual summer meeting, elected as chairman, Carrol A. Garner, vice president and general manager, Jeddo-Highland Coal Co., succeeding Harry Montz. William G. Geise, Kingston, was elected vice chairman, and Floyd

Know the Facts About Your Field

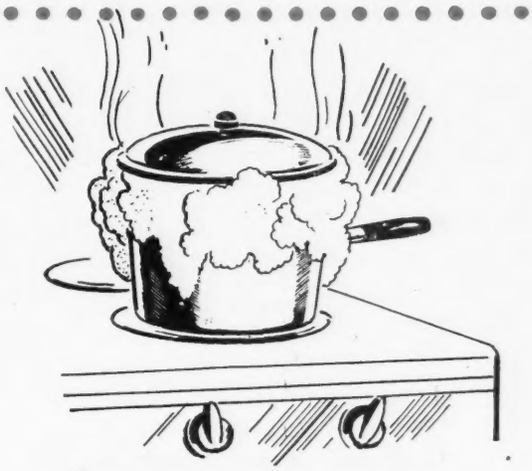
1 WHAT IS THE THICKEST VEIN OF BITUMINOUS COAL?

☐ 50 feet ☐ 75 feet ☐ 100 feet



2 WHAT IS THE SIZE OF THE LARGEST POWER SHOVEL BUCKET?

☐ 40 cubic yards ☐ 55 cubic yards ☐ 25 cubic yards



3 WHAT MINERAL "GROWS" 16 TIMES WHEN HEATED?

☐ Vermiculite ☐ Asbestos ☐ Chromite

4 WHAT IS A GELAMITE?

☐ An explosive for mining or quarrying
☐ Soft, iron-bearing ore
☐ An insect that feeds on earth or rock

ANSWERS

1 A vein of bituminous coal, now being worked at the Elkol Mine, Elkol, Wyo., is 100 feet thick at points and is from 20 to 50 feet thick along the working face. This rich vein is reputed to be thickest in the world.

2 Forty cubic yards is the size of the world's largest bucket now in operation on a shovel at the Hanna Coal Company, near Cadiz, Ohio.

3 Because it often expands or exfoliates to 16 times its original size when heated, the non-metallic mineral, Vermiculite, has found widespread use as an insulating material. Recently, this valuable mineral has also been employed extensively as a light-weight aggregate in concrete.

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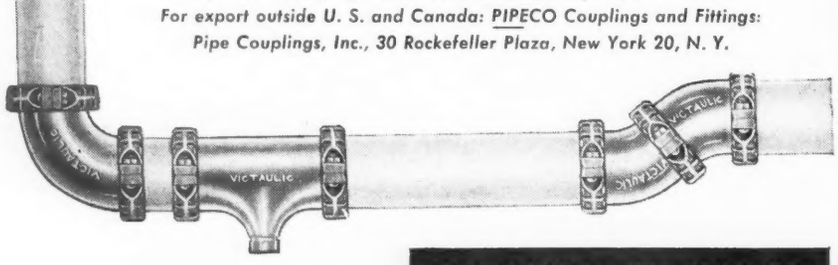

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Sanders, Dallas, was reelected secretary-treasurer. Elected members of the executive committee for three years were: Harry J. Connolly, Scranton; Charles A. Gibbons, Kingston; Herbert D. Kynor, Hazelton; and John C. MacCartney, Kingston. Other members of the executive committee include: George A. Roos, Pottsville; John A. Marshall, Scranton; Henry Dierks, Kingston; Oscar W. Shimar, Pottsville; Charles D. Rubert, Lansford; Cadwallader Evans Jr., Scranton; Joseph E. Ward, Hazelton; Edward Griffith, Kingston; William C. Muehlhof, Pottsville; and William E. Conroy, Scranton.

Illinois Coal Operators Association has elected J. Roy Browning, formerly president, Freeman Coal Mining Corp., vice president and labor commissioner of the organization. Mr. Browning, who will handle labor relations for the association in addition to other duties, is a partner in the Chicago law firm of Parkin & Browning and for a period of three years was attorney for the U.M.W.A., District 12.

Smokeless Coal Producers' Association has been organized in Washington, D. C., as a successor to the bituminous producers' advisory board for District 7, with the following officers: P. M. Snyder, chairman, D. H. Newhall, vice chairman, R. E. Brockman, treasurer, and W. G. Caperton, secretary. Mr. Caperton, "on loan" from the Smokeless Fuel Co., Charleston, W. Va., succeeds Harry Thompson, who resigned Aug. 1 to become vice president of the Davis-Clinchfield Export Coal Corp., Baltimore, Md.

Pond Creek-Tug River Mining Institute, South Williamson, Ky., has appointed as secretary-treasurer, Stephen C. Younger, safety director, Pond Creek colliery, mining department, Norfolk & Western Ry., Williamson, W. Va.

National Coal Association has announced the appointment of P. L. Shields, vice president and general manager, U. S. Fuel Co., Salt Lake City, to the NCA Marketing Committee. Mr. Shields, who has been associated with U. S. Fuel since 1939, is also a member of the association's recently organized safety committee and of the National Joint Wage Conference.

•

Miners Help Improve Strip-Land Park

Twenty coal miners of Linton, Ind., who donated their time during a recent mine vacation to work 12 to 14 hours a day, have completed 8½ miles of automobile roads and bridle paths in the municipally-owned Lee-Sherrard Park adjacent to the city's limits. These public-spirited miners

THE RUHR—
VALLEY OF DECISION

FOR AMERICANS and for American business the most important single spot on earth today is the Ruhr Valley of Germany—a valley no bigger in area than the State of Rhode Island. Upon recovery in the Ruhr hinges recovery in Europe. Upon recovery in Europe hinges the peace of the world.

No machine can run with its most important part missing. Western Europe without the Ruhr is a dead machine. Before the war, over half the coal and steel produced in the Western part of Continental Europe came from this one little valley. Today, the fact is that no other region in Europe has the technical skills and enterprise to produce the industrial supplies which Europe must have if it is to help itself back to a self-supporting economy. And, after observing Europe for many weeks, I am convinced that no one but the United States can successfully supervise the rebuilding of the Ruhr.

If you will keep four considerations in mind, as the international politicians gamble, you can easily tell whether the United States is playing its proper role in the rehabilitation of the Ruhr. Here are the four considerations:

I. We are paying for the Ruhr rehabilitation (or the lack of it).

II. We alone have the skill and enterprise to supervise its rebuilding.

III. It will be a tough organizing job requiring money, hard work, and outright sacrifice on the part of management men and technicians.

IV. We had better do it well if we love our children.

I

We are paying for rebuilding the Ruhr—or we soon shall be. The British now control the Ruhr, its government and its industry. They have been paying out about four hundred million dollars—American dollars—a year to buy the food, raw materials and equipment needed to rebuild the Ruhr. The British must spend American dollars for these supplies because the supplies can not be bought anywhere but in America. Thus far the British have, in effect, obtained the dollars which they spend for the Ruhr by drawing them out of the $3,750,000,000 loan which we granted Britain last year.

Now the loan is fast running out. The British lack dollars and other assets. We must take over, directly or indirectly, the dollar expenditures for rebuilding the Ruhr. We shall pay for it. Therefore—

II

We should supervise it. The British have been running the Ruhr's industry. They might conceivably suggest to Washington that they continue to run it while we pay the bill. *That we should never agree to.* There is a sound old rule that he who pays the piper shall call the tune.

Perhaps we would not need to invoke that rule if the British had done a good job reviving the industries of the Ruhr. *They have done a poor job—physically and ideologically.*

The physical output of the coal mines and steel mills of the Ruhr in recent months was actually smaller than at the first of the year. Production of coal amounts to little more than half of the pre-war 127 million tons per year. Steel productions limps along at one-sixth of the pre-war rate—far below the volume permitted even under the present low level-of-industry plan for Germany.

Ideologically, the British Labor Government has tried to export to Germany the brand of socialism which is making such a dubious record at home. Foreign Minister Bevin—although he may now have misgivings about it—committed himself to nationalization of the Ruhr's coal and steel industries. British representatives have pushed hard to get General Lucius Clay, our able military governor in Berlin, to agree to socialization of the Ruhr. So far, he has resisted this pressure, but our State and War Departments and we as individuals must back him up to the limit if he is to continue to combat this pressure successfully.

Even if the British government were not socialist, there would be good reason for questioning the ability of Britain to rehabilitate the industries of the Ruhr. In recent generations, the British management class has shown itself more

interested in cartels, restricting output, and allocating markets, than in full-steam, ingenious enterprising production.

Certainly the British must remain full partners in the *political* administration of Germany. No one suggests anything else. However, their recent production record demands turning the job of revitalizing the Ruhr industries over to the nation which is paying the bill and which leads the world in production.

If we have any faith in the business philosophy by which we have lived and prospered for 170 years, we should demonstrate that that philosophy still is dynamic by taking up the burden of the Ruhr.

III

It will be a tough job. It will require men and supplies and money from the United States. It can not possibly be done in less than five years. A list of some of the necessary steps shows how hard it will be.

A. Plans for socializing the Ruhr should be shelved quickly. The industries there should remain in trusteeship for five years. Then the Germans themselves should decide their ownership; let us hope that by that time we can demonstrate to them that private ownership and private initiative mean high production, good distribution and high wages.

B. The top supervising management jobs—both the top policy and the top technical jobs—required outstanding business ability. That is why American business men must be willing to go to Germany, sacrificing comfort and leisure, and even income, if necessary.

C. Germans should take over the management job at the operating level. The Germans are good technicians. They have a greater incentive than anyone else for getting the Ruhr back in working order. That incentive should be harnessed.

D. Special effort should earn special rewards. There is nothing wrong with the Ruhr (or the rest of Europe) that hard work will not cure. Before a man will work hard, he must feel that his work will advance him and his family. That simple motive, which powers our whole economy, must be revived in the Ruhr. To revive it requires enormous ingenuity and work... a new currency... a logical customs union... a sensible ration system... enough food, clothing, housing and consumer goods so that the worker can buy something with his currency and his ration points.

E. America will have to furnish a good share of these foodstuffs and supplies. Certain key items of equipment also will be needed. Only as w succeed in our job can this flow be diminishe

F. A sensible priorities system must channe Ruhr coal and steel into those uses which, i turn, will further increase output. Repair par for railroad cars should stand high on the lis Housing, coal equipment and machine tool par should come ahead of the automobiles and pe manent steel bridges which at times have bee accorded preference.

German technical management of industry i the Ruhr—point C above—need not mean pol *tical* control of the Ruhr by some future sov ereign German state. As the French know, th Ruhr, next to the atomic bomb, is the most dan gerous weapon in the world. It is the arsena without which no European power, even Russia would dare start a war. There is no sense i turning that arsenal back to the *political* con trol of a nation which twice in 25 years used for aggression. (And three times since 1870. Surely we have enough resourcefulness to le the Germans who live in the Ruhr run the in dustries there without turning political contro over to a central Prussian state.

This partial list shows how much hard wor and statesmanship the United States must pu into the Ruhr. But—

IV

We had better do it if we love our childre If we do not do this job—if we should pull ou of Germany or fail there—we leave behind us vacuum which neither Britain or France has th strength or ability to fill. Russia has the will an if left unopposed, the power to fill that vacuum Therefore, the day we fail or the day we pull ou of Germany, the third world war takes a lon step closer to us and certainly to our childre What greater incentive does any American nee to work for than our success in this field?

If we succeed, the western zones of German in conjunction with Belgium and Holland ca become self-supporting in three to five year That way lies recovery for all Europe. That wa lies peace for the world. That way lies vindica tion for the American business system in whic we believe—the system of competitive privat enterprise, with freedom for the individual an his initiative.

James H. McGraw, Jr.

President McGraw-Hill Publishing Company, In

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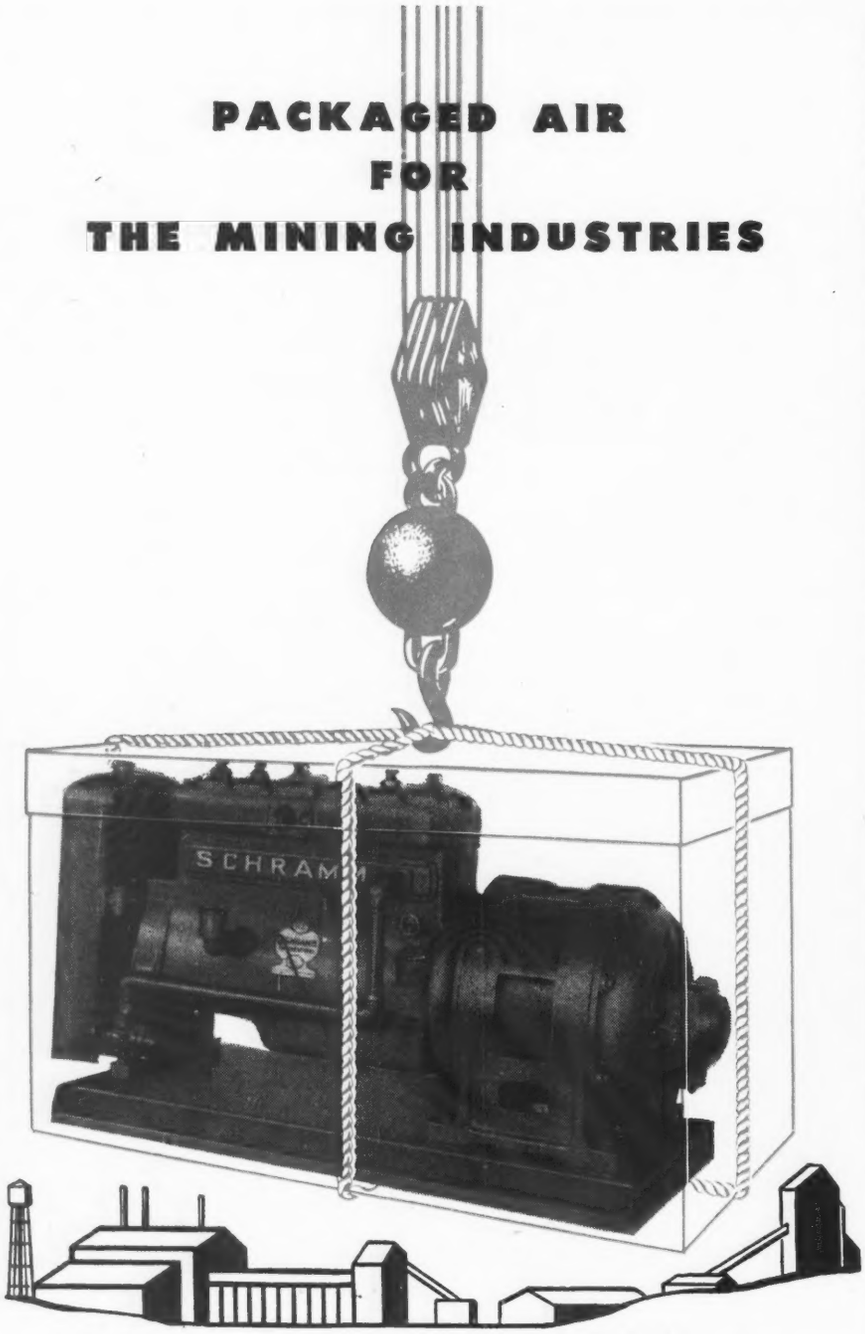

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were assisted in their self-appointed park project by four local coal companies who donated the use of more than $100,000 worth of construction equipment.

The park consists of 600 acres of strip-mined land donated to the city of Linton several years ago by local coal-mining companies. The area has been reforested with evergreen trees and is dotted with 27 small lakes, which have been stocked with game fish by the Linton Community Conservation Club.

Approximately 3½ miles of the new road system was constructed a year ago during a work stoppage. Other recent work completed during the various mine vacations include the leveling and clearing of a five-acre plot of ground in the southeast corner of the park, where the Conservation Club and the Linton Saddle Club plan to build a 1/5-mile "western-style" horse-race track, and a smaller track for exhibition of gaited horses. Members of the club, to which the miners belong, are now using their spare time to complete a new skeet and trap-shooting field in the park, which was expected to be completed about Aug. 31.

•

Safety Record Reported For Government Operation

Increased safety in the nation's bituminous coal mines can be attained without hindering maximum production, Secretary of the Interior J. A. Krug was advised in a report on the operation of the Federal Mine Safety Code during the period of government possession, released July 31.

The report, transmitted to Secretary Krug by Capt. N. H. Collisson, federal coal mines administrator, declared that the safety record achieved during the period of government possession "refutes without question" any theory that maximum safety can only be accomplished at the expense of necessary production. The record of 620,751,000 tons of coal produced during the period covered by the report, is second only to the coal produced in the comparable period July 1, 1943, to June 30, 1944, when 630,485,000 tons was mined, the report stated. "Thus it would seem clearly indicated," it said, "that increased safety and maximum production of coal are quite possible and need not be considered as a deterrent in the accomplishment of either objective."

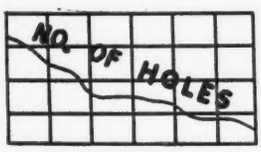
During the period of government possession of the mines, it was said, there were 3,058 inspections of individual mines, of which 2,429 were regular inspections and 629 were special inspections. These inspections revealed 62,002 violations of the Code, of which 40,301 violations were subsequently corrected. In addition, 9,302 violations were in the process of being corrected as of the date of termination of government possession of the

Here's How

Bucyrus-Erie Blast Hole Drills Can Save You *Money!*

There is a marked increase in footage because accurately-timed shock-absorbed drilling and properly fitted tool weights bring sharp drilling blows that lead to high-speed penetration. Quick pick-up of tools helps, too . . . adds to drilling effectiveness by permitting a maximum number of blows per minute.

Several features help boost working time . . . full-length caterpillar mountings for fast moves between drilling sites; permanently attached stabilizing jacks for speedy set-ups; built-in tool wrenches (available on all except the 22-T) for easy tool changes.

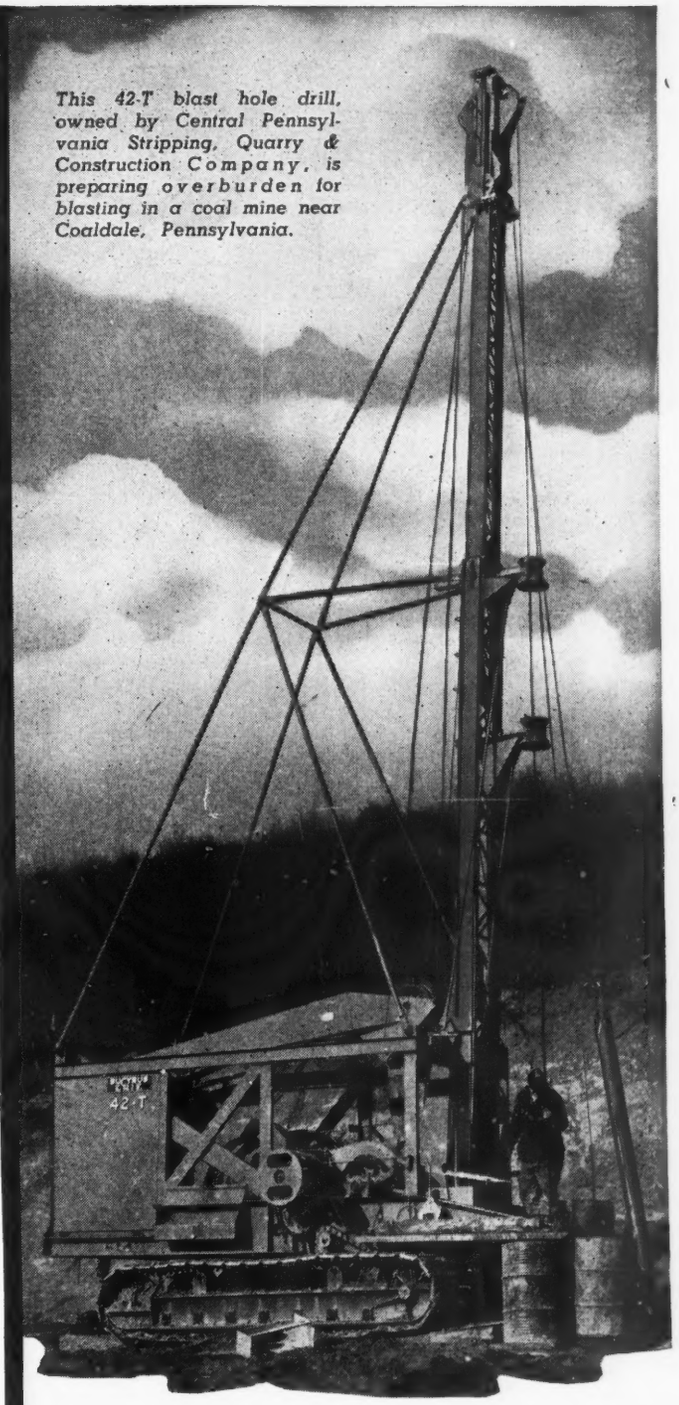


Because of their ability to drill larger holes (5⅝" to 12") than can be handled by wagon or tripod drills, Bucyrus-Eries are able to prepare the same volume of material with far fewer holes.

Less maintenance is required because the strength of the machines' electric-welded frames and derricks resists the stresses of long and constant use. Derrick-head shock absorbers and rubber-insulated heel and spudding beam sheaves protect the units from harmful shock.

Sturdy power units (gasoline, diesel, or electric, depending upon your requirements and the size of the machine) reduce operating costs by applying power most efficiently and keeping fuel consumption low.

21847



This 42-T blast hole drill, owned by Central Pennsylvania Stripping, Quarry & Construction Company, is preparing overburden for blasting in a coal mine near Coaldale, Pennsylvania.

Bucyrus-Eries are money-savers all the way. It will be worth your while to investigate these blast hole drills when you plan your new equipment purchases.

22-T	**5⅝"**	**to 6⅝"**	**holes**
27-T	**6"**	**to 6⅝"**	**holes**
29-T	**6"**	**to 9"**	**holes**
42-T	**9"**	**to 12"**	**holes**

Gasoline or electric power is available for all machines . . . diesel for all except the 22-T

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the blade lies flat on ground and does not rock—the edge of the blade slides into the coal, rather than digging under it.

BIG FIST COAL SHOVELS *speed production* because their generous size and fine precision balance enable miners to do more work with less effort and fatigue. Experienced miners prefer Big Fist. Smart Buyers always specify Big Fist.

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mines. Thus 80 percent of the violations were subsequently corrected or in the process of being corrected. This sharply contrasts with the previous record of 15,000 violations reported as corrected in the 63-month period from May, 1941, to July, 1946.

The use of rock-dusting during the effective period of the Code increased tremendously as compared with previous years, the report stated. Of the 2,600 mines under federal control, 399 applied this method of controlling underground explosions for the first time, and 739 other mines brought their rock-dusting up to the standards required by the Code. In 1936, for example, only 460 mines in the United States were reported as using rock-dusting, with 71,409 tons used.

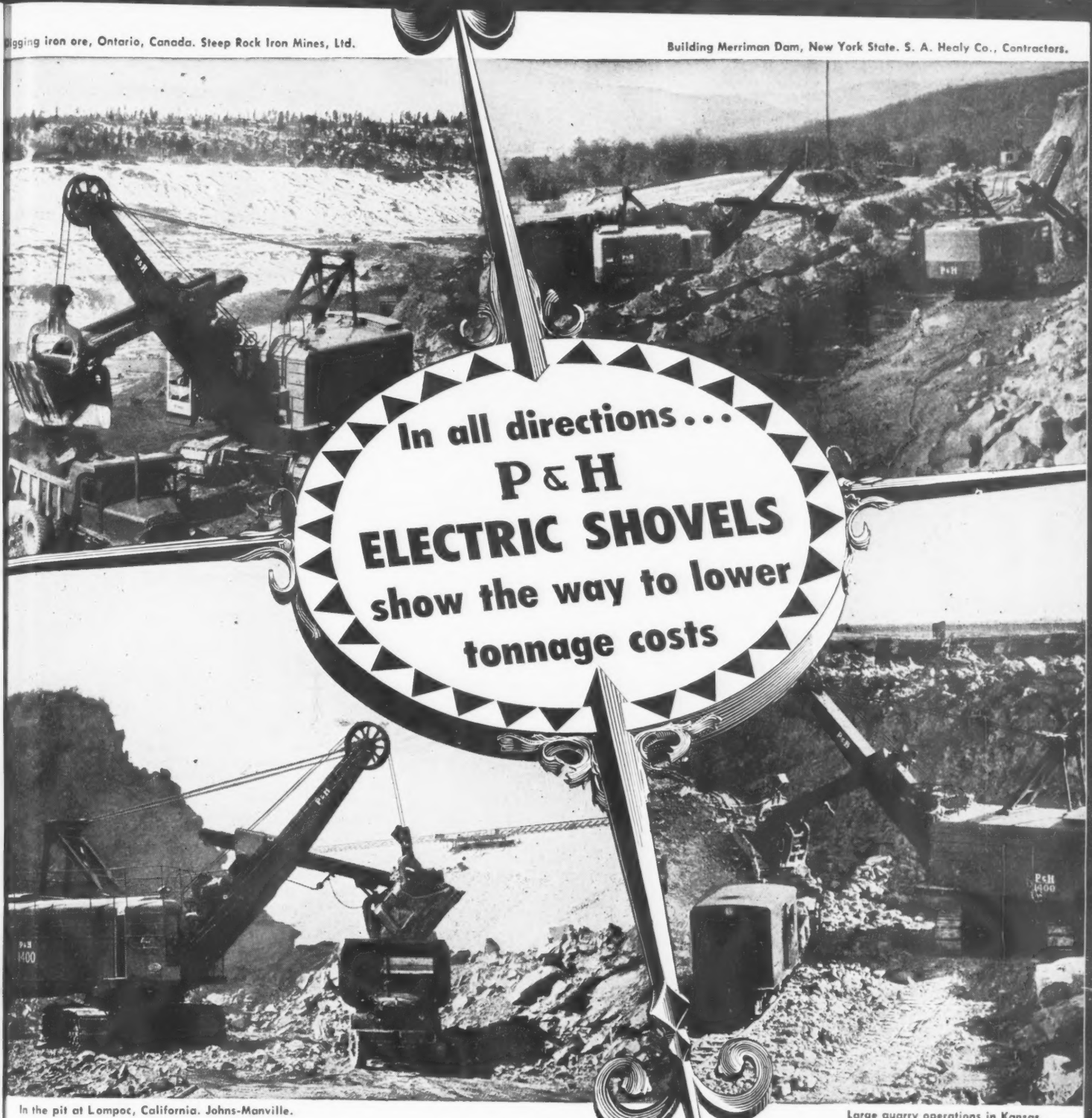
The report, illustrated with a series of charts and graphs, covers, among other things, the importance of preshift examination, ventilation, improved blasting practices and improved timbering. The questions of smoking underground and replacement of open lights with electric lamps are also discussed. Copies may be obtained from the Division of Information, U. S. Department of the Interior, Room 7213, Washington 25.

•

Anthracite Firm Upheld In Lunch Dispute

The Lehigh Coal & Navigation Co. was upheld last month in a decision handed down by Umpire Thomas Larkin of the Anthracite Board of Conciliation on its protest against miners who insisted on quitting their jobs at lunch time.

In his decision, Mr. Larkin maintains that the company's 1:30-p.m. quitting time was fair and that it was justified in docking workers who left their jobs before that time.



Digging iron ore, Ontario, Canada. Steep Rock Iron Mines, Ltd.

Building Merriman Dam, New York State. S. A. Healy Co., Contractors.

In the pit at Lompoc, California. Johns-Manville.

Large quarry operations in Kansas. Lehigh Portland Cement Co.

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Foreign Developments

BRUSSELS—The first experimental attempt to convert coal into gas underground was reportedly to take place at Bois-La-Dame, near Liege, Sept. 1. Gasification of layers of poor-quality coal, mining of which ordinarily would not be profitable, will, it is hoped, enable Wallonia to maintain a large number of its industries operating on domestically produced gas and to create new industries.

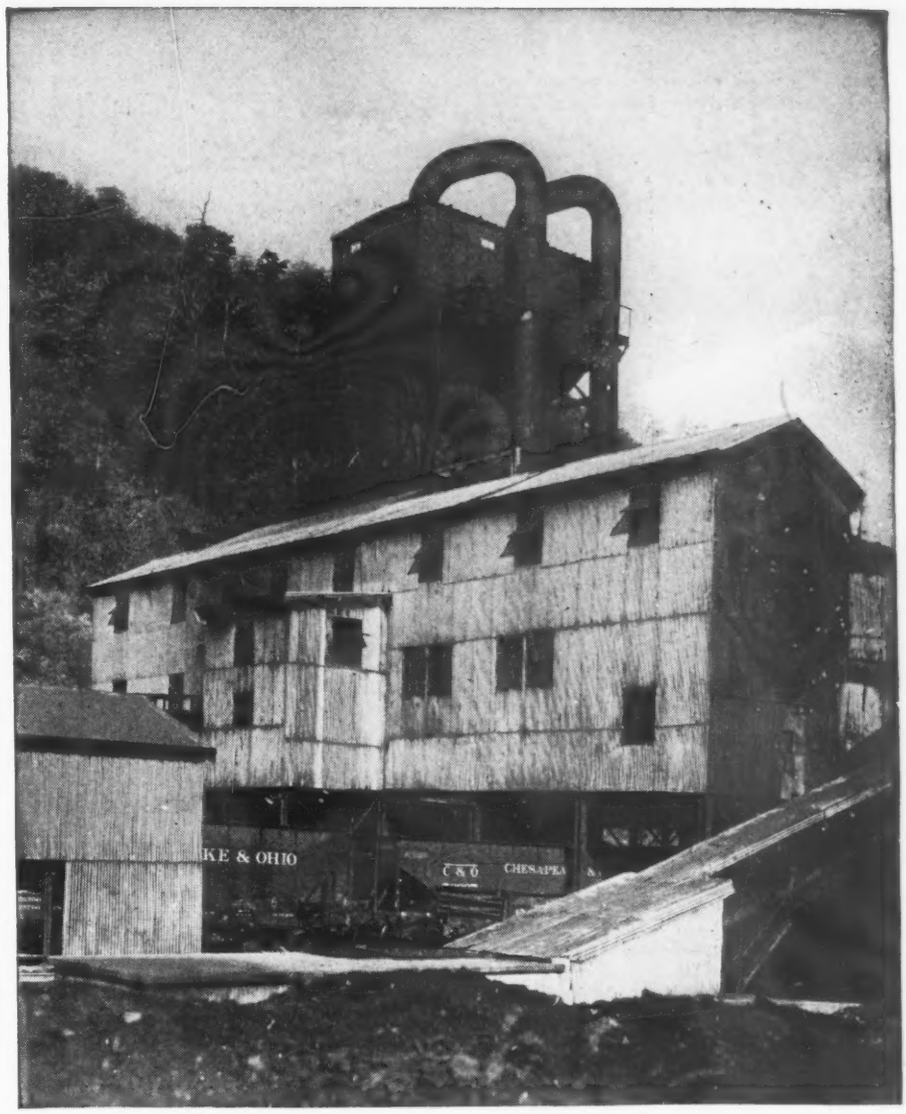
According to reports, a series of horseshoe-shaped galleries have been constructed through the coal seams, beginning and ending at a small pit shaft. An incendiary bomb placed in a stretch of gallery farthest from the shaft is to be electrically fired from the pit head. Air is pumped into one end of the gallery and the gas produced is, at the same time, forced out of the opposite opening and up to the surface. Power to be produced from the gas-driven electrical generators installed nearby will run to only 25 percent of present-day costs, it is said.

WHITEHAVEN, ENGLAND — Britain experienced its worst mine disaster since 1934 when only 13 of 117 men underground at the time survived an explosion Aug. 15 at the William mine near Whitehaven. The mine, originally opened in 1812, extends several miles under an inlet of the Irish Sea, at depths of 800 to 2,000 ft. Rubble and gas caused by the explosion greatly hampered rescue work and it took rescue workers 12 hours to make their way to the working places two miles out under the sea.

TOKIO—The Japanese government through its Reconstruction Finance Bank is loaning one billion yen to 23 coal-mining companies in an effort to boost the country's output to 30,000,000 tons yearly, the goal set for 1947. The loans, which have been approved by the Supreme Commander for the Allied Powers, will be used for the development of new pits and facings, to pay for new machinery and for repair of equipment and shafts that deteriorated during the war.

If the rate of 2,120,000 tons monthly maintained through July is not improved, this year's output will fall short of the 1947 goal by 4,600,000 tons and will put a serious crimp in Japan's economic recovery. The low production, which has been less since the war than at any time since 1929, results from the poor condition of

Pangborn Makes Coal Dust Behave



Desire for increased safety and improved working conditions—lower-cost equipment maintenance—efficient coal dust disposal and reclamation—elimination of nuisances—is responsible for the large number of Pangborn dust control installations in coal preparation plants.

For many years a "Pangborn" has been the recognized method of effectively collecting the fine coal dust that is produced in the operation of tipples, dry cleaning, de-dusting and other coal preparation facilities.

With this background of successful experience in the coal industry, Pangborn engineers offer you an effective and economical solution to your dust problems.

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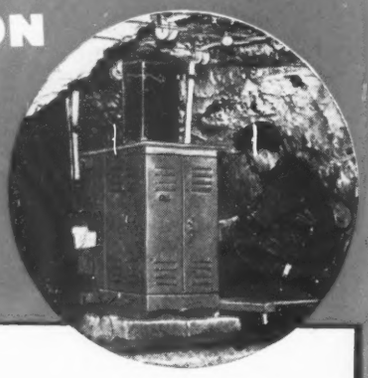
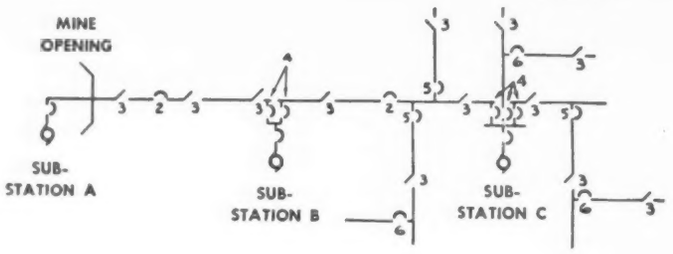
Sample layout No. 4 in a series illustrating recommended sectionalizing practices





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2. I-T-E Type KSC Circuit Breaker—installed in circuit between each two substations.
3. A disconnect switch or protective device placed at not over 1500 foot intervals in every power line.
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5. I-T-E Type KSC Circuit Breaker—installed as overcurrent protective device at each main branch circuit.
6. I-T-E Type KSC Circuit Breaker—to protect secondary branch circuits (*i. e.* a circuit feeding only one local section or territory).

Note: In every case, sufficient feeder and return circuit capacity should be provided so that circuit breaker will be opened by a dead short at the most remote point of the circuit.

When electrical distribution systems are sectionalized with I-T-E Sectionalizing Switchgear, production levels are raised: time lost because of electrical disturbance is kept to a minimum, and safety to personnel and equipment is assured.

In the above application, the heart of protection is the I-T-E Type KSC Automatic Reclosing Circuit Breaker. The only circuit breaker designed especially for the mining industry, the KSC has ample flexibility for meeting changing mine conditions. Completely dependable, it is durable and efficient under the most severe operating demands. Rugged and compact for easy portability, it is also completely metal-enclosed for safety—yet readily accessible for inspections and maintenance.

The I-T-E representative in your locality can give you complete information on the I-T-E Type KSC Automatic Reclosing Circuit Breaker. He is also fully qualified to assist you in the adoption of recommended sectionalizing practices in your mine. Use his services with no obligation.

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the mines, shortages of material and equipment, inexperienced miners, financing and indifferent management.

During the war, coal was mined in Japan at any cost, with little attention paid to maintenance of the mines. Over half the labor force was "slave" Koreans and Chinese, who have had to be replaced by Japanese workers. Their recruiting has been slow and their training even slower. Output per worker is now only 5.5 tons per month, as compared to a 17-ton average from 1935 to 1938.

Faced with these and other problems, the mine owners have not shown much enthusiasm in reviving the industry. Failure to revive rapidly during the next six months, it is thought, may force the government to change from its policy of strict control over coal to full nationalization of all mines. The loans, however, are viewed as an indication that the owners will be given a chance "to prove that they are and can work in the national interest."

MELBOURNE, AUSTRALIA — Large-scale development of the huge black-coal deposits at Blair Athol, Queensland, by strip-mining methods is planned under joint Commonwealth and state government management, it has been reported. The deposits are estimated at 400,000,000 tons, and the overburden over the whole field averages less than 1½ to 1 of coal.

The premier of Queensland announced that mechanized handling is planned from removal of the overburden and breaking of the coal until it reaches the ship's hold at Rockhampton, 239 miles from Blair Athol. It is planned to ship 2,000,000 tons a year to other states after satisfying local demand. Total annual production so far has averaged 350,000 tons.

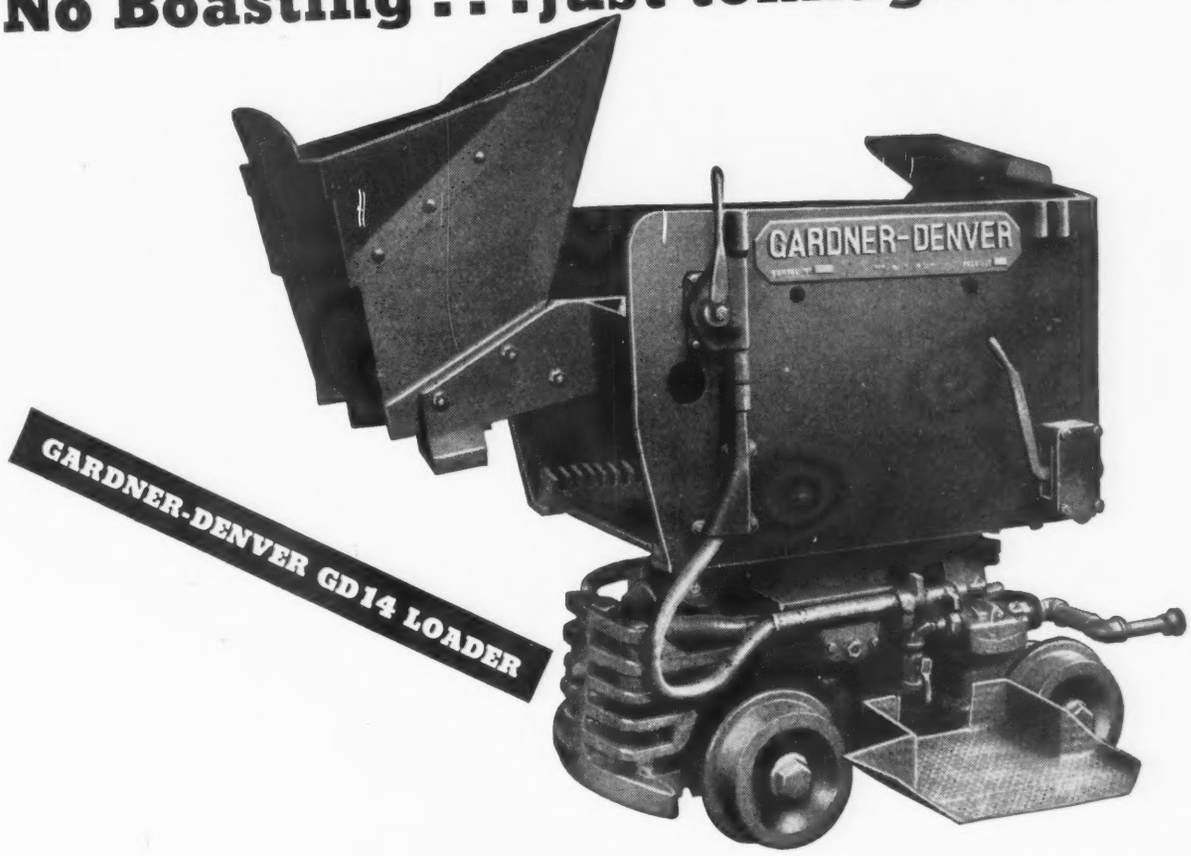
NEW DELHI, INDIA—Collieries in India will shortly have the benefit of a 10-year program of sand-stowing for the conservation of coal, with the Government of India in the Works, Mines and Power Department setting up a committee to draw up such a program and submit it before Sept. 15, 1947.

The Coal Commissioner with the Government of India will be the chairman and convener of the committee, on which the chief inspector of mines in India, the chairman of the Coal Mines Stowing Board and a representative of the Railway Board will serve as members.

The committee was to be instructed to draft the program along the lines suggested by the Indian Coalfields Committee, 1946, which urged that compulsory stowing already in force, wherever deemed necessary for purposes of safety, might be extended to also aid production and conservation.

Already, in pursuance of the Indian Coalfields Committee's recommendation to assist stowing, the Gov-

No Boasting . . .just tonnage Boosting!



Power and speed—for loading your large mine cars, two to three tons per minute! One powerful 5-cylinder radial air motor crowds the dipper into the muck pile for a bigger bite. Another lifts the dipper for complete mass discharge into the mine car.

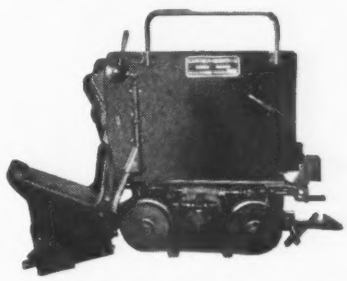
Wide clean-up range—and the muck goes into the mine cars—not beside them—thanks to the automatic centering device which locks the body of the loader on center so that dipper discharges directly into the car.

Simple design saves power—shaft drive to bevel gears on all four wheels—plus fewer gears—gives you every ounce of available power from the air motor.

Protection from discharge shock—the power of the dipper is automatically cut off just as the dipper reaches its upper and lower limit of travel. Thus machine is protected from discharge shock.

Greater safety for operator—a low center of gravity—with the main weight of the loader concentrated near the wheels—means maximum stability on the track. Minimum of outside piping also is an important Gardner-Denver safety factor.

Easy to disassemble—loader knocks down easily into complete sub-assemblies when necessary for moving through small shafts.



Gardner-Denver GD9 Loader—A companion loader to the GD14, the GD9 fills the need where a smaller loader is required. Like the GD14, the GD9 embodies the results of Gardner-Denver's research—meets recognized Gardner-Denver standards of sturdy construction, reliability and fast operation.

GARDNER-DENVER SINCE 1859

For complete information, write
Gardner-Denver Company, Quincy, Illinois

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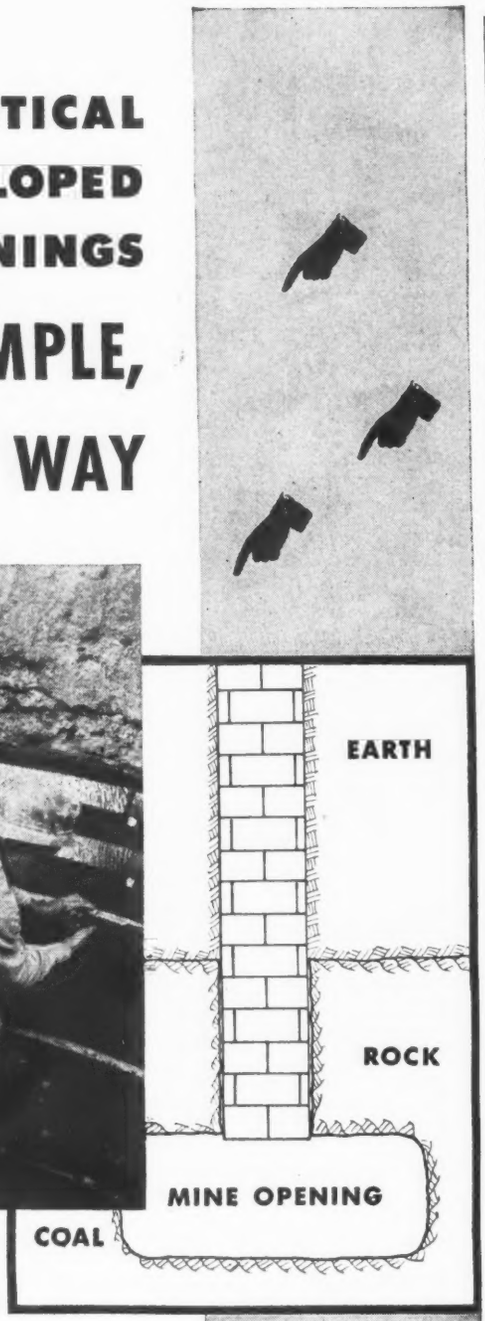

Air shafts and escapeways are built quickly and economically with ARMCO Tunnel Liner Plates.

Here's an easy, economical way to provide ventilation and safety as active workings extend from original mine openings. Simply use ARMCO Tunnel Liner Plates to sink new shafts.

These plates are amply strong and provide worth-while durability and safety from fire hazards. One man easily handles the light-weight steel sections, bolting them together with regular wrenches. Costs are low and the job is speeded.

You'll find ARMCO Tunnel Liner Plates ideal for sloped entries, air shafts, escapeways, substations and overcasts. Write for data on Armco tunneling methods. Armco Drainage & Metal Products, Inc., 1575 Curtis St., Middletown, Ohio.

See the Armco Exhibit at the Coal Show— Booth 409

ARMCO

ARMCO TUNNEL LINER PLATES

ernment of India has recently raised the assessment on coal, soft coke and hard coke. The question of a higher assessment will arise after the committee, now set up, has drawn up the program and made an estimate of its cost.

Moscow—Postwar development of the Kutznetsk basin in western Siberia has not measured up to the pace set by Russia's new five-year plan, which calls for 42,000,000 tons of coal from this area in 1950, according to reports. Production expanded during the war but in 1946 was 96.4 percent of the quota and this year is still lagging. Reasons for the failure to fill the quota are variously attributed to poor organization of labor, a low wage scale, inadequate training of young miners, an acute shortage of skilled engineers and technicians and failure to exploit developments fully.

However, efforts to boost output are being made by building new mines in the basin, increasing mechanization and training young men to work in the mines. By 1950, 30 new mines with an aggregate capacity of 18,000,000 tons are to be built. Some mines already are nearly 100 percent mechanized, and over-all mechanization in the area is said to be high. Use of the "flow" method, involving complex mechanization of all development and working processes with special machines for cutting, hewing and filling of coal and conveyors, especially in mines with sloping seams which require much labor, has doubled output, it is said, with half as many men working and, in addition, has cut timbering requirements 35 to 40 percent and production costs 25 to 30 percent. In thick, high-dip seams, shields that move slowly down under the weight of crumbling rock have replaced stationary timbering and have increased output at the face by four to five times. Also, a new shuttle-type mining combine and a coal-cutter hydromonitor, which uses a high velocity water jet to cut through five meters of a seam in an hour, are being counted on to lift production.

To train new workers, Russian engineers have designed miniature mine shafts, the first of which recently was shipped to Prokopievsk. Consisting of 22 sectional models, each shaft portrays in cross-section the entire coal-mining process: entry driving, timber setting, coal cutting and haulage. Special models show safety devices and ventilation and drainage systems.

Coal seams in the Kutznetsk basin average 20 to 23 ft. thick and in some places are 50 to 60 ft. thick. The coals lie close to the surface and are of first-rate quality, the best grades containing only 0.3 to 0.6 percent sulfur and 4 to 12 percent ash. Although output lags behind that of the better-developed Donets basin, total reserves of the Kutznetsk basin are said to be five times as great. Production in 1946 from the Kutznetsk mines totaled 27,965,000 tons. Thirty million

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Lubricants protect machine parts against the destructive action of rust and corrosion. This feature alone puts LUBRIPLATE far out in front of conventional lubricants.

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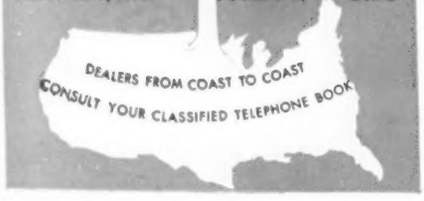

Ice Cream Tastes as Good Underground

ONE OF THE UNEXPECTED, but nevertheless pleasurable, possibilities of the new elevator installation at the portal of the Willow Grove mine of the Hanna Coal Co. (Coal Age, June, p. 78) was demonstrated recently when foremen attending a meeting in the foremen's office at the bottom of the shaft drew lots to see who would hop upstairs to secure ice cream for the group. It took only a few seconds to ride the elevator 182 ft. to the surface and walk to the Portal Grille a hundred yards from the portal of the mine. Those of the group shown enjoying the treat are John Skrtich (left), Stanley Kolodziej, John Schlatt, Fred A. Felix and Joseph Mills.

Sovfoto

Future Russian Miners in Training

A GROUP of future Russian coal miners are shown in a local mine school near the Stalin mine in the Kuznetsk coal basin of Western Siberia, which is said to be the largest coking-coal mine in the USSR. An acute shortage of skilled engineers and technicians in many mines in the area and the necessary employment during the war of young inexperienced miners are reported to be important factors in the lack of satisfactory production.

tons is scheduled for 1947.

Main obstacle to full industrial development of the Kutznetsk basin is transport. A branch line connects the region with the Trans-Siberian trunk line, over which coal is delivered to the South Urals metallurgical centers, and a shorter rail connection to the Urals will be established with completion of the new South Siberian railroad, scheduled for 1950. Meanwhile, deliveries of iron ore from Magnitogorsk to the Kutznetsk basin over 1,200 miles of rail have fallen far short of requirements and have led officials to urge faster development of large ore deposits in nearby Gornaya Shoria.

No Stone Is Left Unturned . . .

Yes, when it comes to keeping a mine *completely safe,* Bituminous Safety Engineers overlook nothing. They conduct a comprehensive safety program for Bituminous Workmen's Compensation policyholders . . . a program created to help save lives and to reduce the frequency and severity of accidents. Embracing both laboratory and field work, this Safety Engineering Program includes regular mine inspections . . . analysis of hazards . . . survey result recommendations . . . accident prevention activities . . . reduction of operating expenses resulting from accidents . . . establishment of production efficiency. The program covers all aspects of mine safety . . . serves not only mine owners, but operators and workers as well.

Be sure YOU leave no stone unturned for complete mine safety. Get Bituminous Workmen's Compensation insurance . . . and benefit by the Bituminous Safety Engineering program.

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BITUMINOUS CASUALTY CORPORATION

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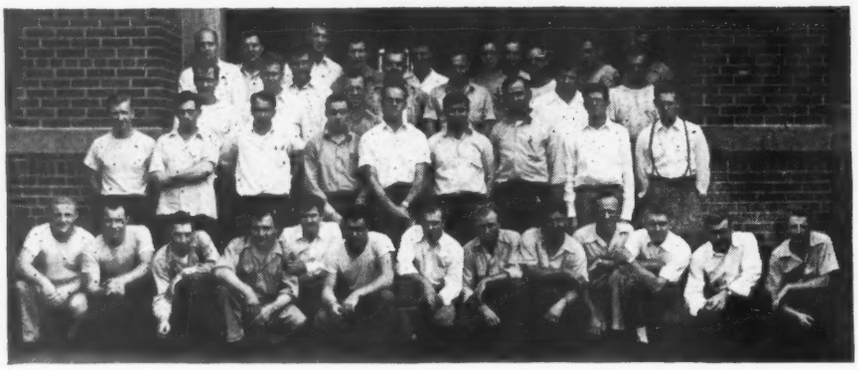

FORTY MEN—miners and foremen—who completed a six-weeks summer session for mining men at St. Francis College, Loretto, Pa.

Pennsylvania Miners End Summer College Session

More than 40 coal-company employees, some of them foremen, completed Aug. 9 the first part of a projected three-summer course in coal mining at St. Francis College, Loretto, Pa. Subjects studied during the six-weeks term included mine safety, mining machines, mine management, personnel problems, Pennsylvania mine laws, economics, labor organizations and mathematics. The plan calls for awarding a certificate of completion to those men who finish the three summer sessions.

Supplementing the classroom work, carried on by the college faculty, coal-industry experts lectured on the miners' problems, mechanical mining, mine safety appliances, coal marketing and pricing, mine electricity, geology, mining methods, state agencies and education.

Under a tight six-day schedule for the session, nearly half of the students lived in quarters provided by the college. The remainder commuted from their homes close by, some of them going to college by day and working the night shift at their regular jobs. Fifteen coal companies in the Central Pennsylvania field were represented among the enrollees.

Plans for the course, which is fully accredited as college work, originated with a former president of the college, were further developed by the college's advisory board, which numbers some coal operators among its members, and were backed by a $50,000 appropriation from the Central Pennsylvania Coal Operators' Association. The Very Rev. Adrian J. M. Veigle, T.O.R., now is president of the college. Director of the summer session for mining men was The Rev. Francis Flanagan, and Henry K. Meintel was coordinator.

•

Mine Fatality Rate Dips Slightly in June

Accidents at coal mines in the United States caused the deaths of 61 bituminous miners and 6 anthracite miners in June, 1947, according to reports furnished the U. S. Bureau of mines by state mine inspectors.

For the two industries combined, in producing 52,297,000 net tons, the preliminary fatality rate in June was 1.28 per million tons, a fraction less than the latest figure of 1.30 for May, 1947, and that of 1.33 for June, 1946, later revised to 1.55.

With a production of 47,700,000 tons, the preliminary bituminous fatality rate was 1.28 per million tons in June, slightly higher than the latest rate of 1.20 for May, 1947, but less than the revised rate of 1.56 for June, 1946.

The preliminary anthracite rate for June, 1947, in mining 4,597,000

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Roxbury Visual and Audible Mine Fan Signal with blinking light complete — $124.00.

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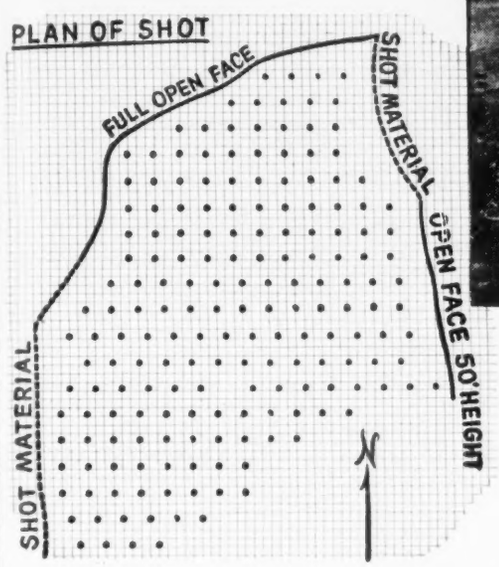
General view of shale overburden. Note drill rigs in left background and stakes (in center) marking loaded holes. Loading started two months before shot was fired!

Field sketch (below) of shot plan showing tremendous area of overburden and position of the 186 drill holes with burden and centers averaging 25 x 25 feet.



380,000-pound "Nitramon" Blast in Coal Stripping Operation

LARGEST SHOT OF ITS KIND REQUIRED 2 MONTHS TO LOAD

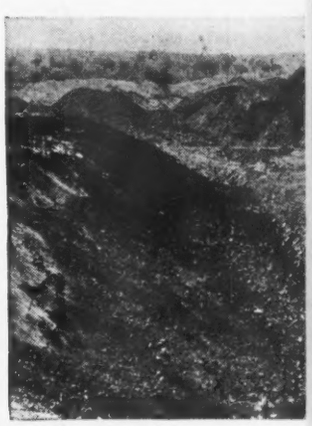
The largest blast ever fired in a stripping operation—and one of the world's greatest industrial shots—was recently supervised by Du Pont Technical Service men at a Pennsylvania anthracite coal stripping operation.

Du Pont "Nitramon"—the safest blasting agent—proved a logical selection for the huge shot, and more than 190 tons were used. The blast required a total of 186 holes averaging 110 feet deep and broke an estimated total of 463,000 yards of shale. Drilling and loading alone extended over a period of sixty days, and a large proportion of the holes were loaded weeks before the shot was fired. This, however, is an entirely safe practice using "Nitramon," and it permitted an exceptionally efficient schedule of the work.

If you too are stripping coal—or contemplate doing so—ask the Du Pont Technical representative in your district for information about "Nitramon." It is the ideal—and the safest—blasting agent for economical and efficient stripping operations.

E. I. DU PONT DE NEMOURS & CO. (INC.)
Explosives Department, Wilmington 98, Delaware

Loading closely followed drilling. Rugged cans of "Nitramon" are water-resistant and may be loaded safely weeks ahead of shot-firing time. Total of 35,000 feet of Primacord were used.



View of 50-foot open face (left) at east side of shot area before great blast was fired. At right, same view after shot completely shattered overburden . . . facilitating removal of shale by shovel and dragline.

PICTURES TAKEN AT PHILADELPHIA AND READING COAL AND IRON COMPANY OPERATIONS; SHENANDOAH MINING COMPANY; CONTRACTOR

"NITRAMON" is so safe it cannot be detonated by blasting caps, open flame, or even the impact of rifle bullets. Yet, a combination of "Nitramon" Primer and Primacord detonated by an Electric Blasting Cap readily fires this safest blasting agent.

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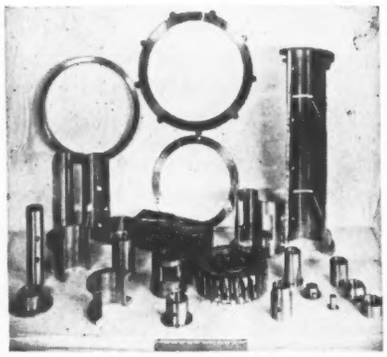

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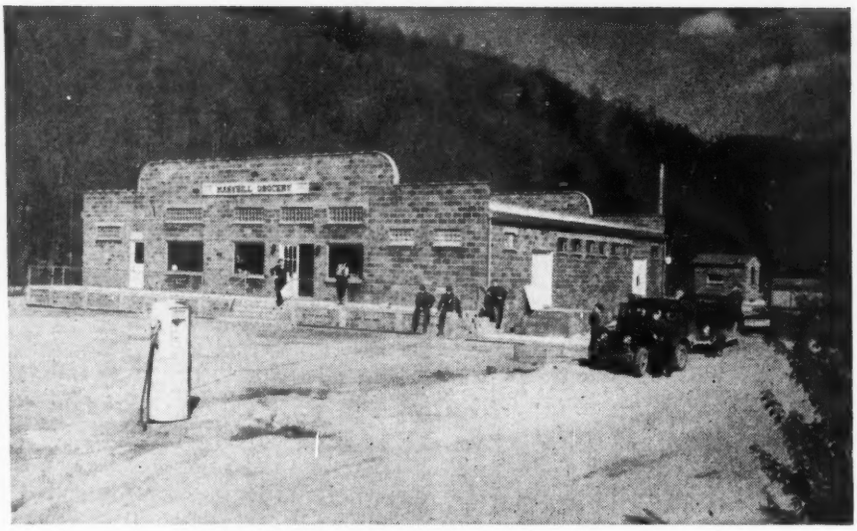


Store and Office for New Panther No. 5 Mine

MARYBILL GROCERY building in Panther Gulch, Nicholas County, West Virginia, was completed earlier this year to serve the new Panther No. 5 mine of the Panther Coal Co., one of the Leckie organizations. The mine offices and the Marybill post office occupy the left side of the building. The store is completely modern, with the latest in equipment arranged to make an attractive, convenient shopping center.

net tons, was 1.31 per million tons, slightly less than half the latest May rate of 2.64 and a fraction less than the revised rate of 1.38 for June, 1946.

June, 1947, fatalities, by causes and states, and comparable rates for the first six months of 1947 and 1946, were as follows:

U. S. COAL-MINE FATALITIES IN JUNE, 1947, BY CAUSES AND STATES

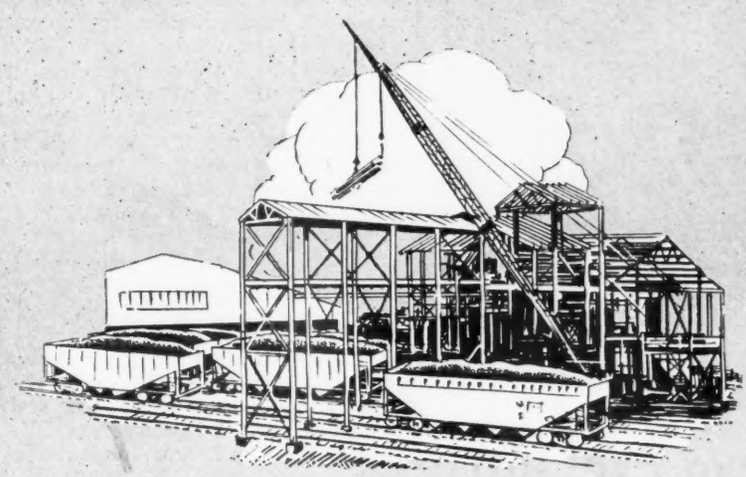
State	Underground: Falls of roof	Underground: Falls of face	Underground: Haulage	Underground: Explosives	Underground: Electricity	Underground: Machinery	Underground: Other causes	Underground: Total underground	Opencut	Surface	Grand total
Alabama	2	..	1	..	1	..	..	4	..	..	4
Colorado	..	..	1	..	..	..	..	1	..	..	1
Illinois	3	..	..	..	..	..	..	3	..	1	4
Kentucky	4	3	1	1	..	..	..	9	..	..	9
Maryland	1	..	..	..	..	..	..	1	..	..	1
Ohio	..	..	..	..	..	..	1	1	1	..	2
Oklahoma	..	..	..	..	..	..	..	..	1	..	1
Penna. (bit.)	7	..	1	1	..	..	..	9	3	..	12
Tennessee	3	..	..	..	..	..	..	3	..	..	3
Virginia	6	..	3	..	1	..	1	11	..	..	11
West Virginia	2	..	6	..	..	2	1	11	1	1	13
Total Bituminous	28	3	13	2	2	2	3	53	6	2	61
Penna. (Anthracite)	2	..	3	..	..	..	..	5	..	1	6
Grand Total	30	3	16	2	2	2	3	58	6	3	67

DEATHS AND FATALITY RATES AT U. S. COAL MINES BY CAUSES OF ACCIDENTS*, JANUARY-JUNE, 1947 AND 1946

Cause	Bituminous: Number Killed		Bituminous: Killed per Million Tons		Anthracite: Number Killed		Anthracite: Killed per Million Tons		Total: Number Killed		Total: Killed per Million Tons	
	1947	1946	1947	1946	1947	1946	1947	1946	1947	1946	1947	1946
Underground:												
Falls of roof and face	227	193	0.732	0.814	34	56	1.223	1.901	261	249	0.773	0.933
Haulage	105	70	.339	.295	12	13	.432	.441	117	83	.346	.311
Gas or dust explosions:												
Local	4	..	.013	....	..	..	....	....	4	..	.012	....
Major	119	27	.384	.114	25	..	.900	....	144	27	.426	.101
Explosives	11	6	.035	.025	4	4	.144	.136	15	10	.044	.038
Electricity	6	5	.019	.021	..	2	....	.068	6	7	.018	.026
Machinery	16	9	.052	.038	..	1	....	.034	16	10	.047	.038
Shaft	2	5	.006	.021	1	1	.036	.034	3	6	.009	.023
	9	13	.029	.055	2	9	.072	.306	11	22	.033	.083
Miscellaneous.												
Total underground	499	328	1.609	1.383	78	86	2.807	2.920	577	414	1.708	1.553
Stripping or opencut	15	13	.048	.055	3	5	.108	.170	18	18	.053	.068
Surface	21	25	.068	.105	11	6	.396	.204	32	31	.095	.116
Grand total..	535	366	1.725	1.543	92	97	3.311	3.294	627	463	1.856	1.737

*All figures are subject to revision.

When it comes to . . .



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- **Engineering**
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For 42 years Heyl and Patterson has been solving Coal Preparation problems. Today's *modern problems* in building Coal Preparation Plants *are not New Problems.*

The solution of today's problems must come from engineering organizations with knowledge born of experience.

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Coal Crushers
Refuse Disposal Cars
Coal Storage Bridges
Ore Bridges
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Bradford Breakers
Coal & Coke Handling Equipment
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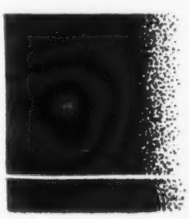

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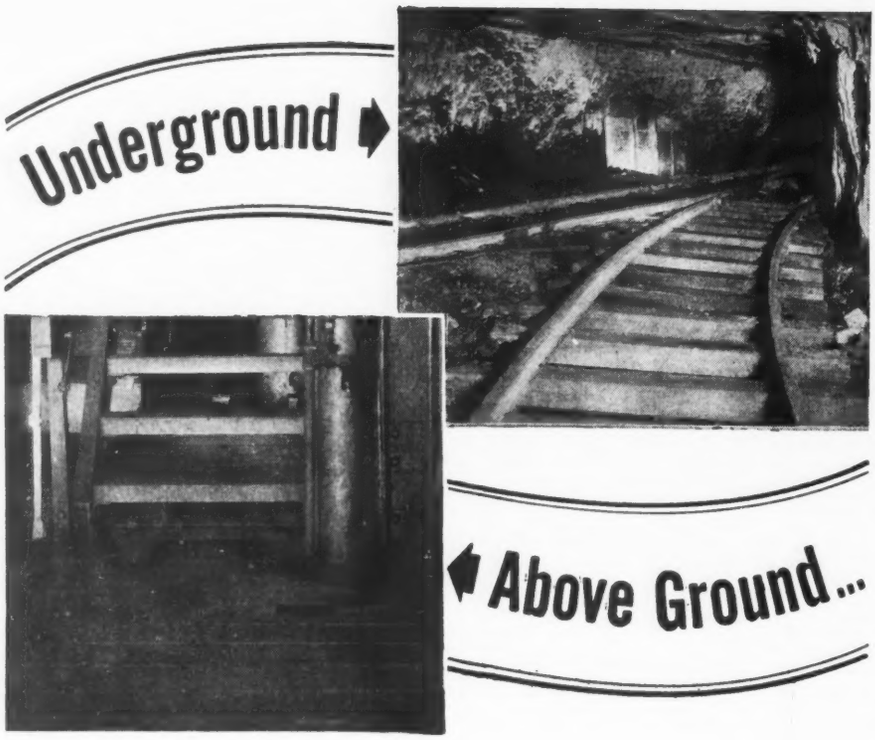

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REDUCE MAINTENANCE COSTS: Timbers and ties treated with Chromated Zinc Chloride resist decay . . . retard fire. Replacements and repairs due to crushing, fire, and decay-weakened props are reduced.

INCREASE SAFETY: Treated timbering provides safety factors at the lowest cost—helps to eliminate dangerous roof falls and derailments. Because "CZC"-treated wood resists fire, it helps to reduce operating hazards which may occur by igniting of timber.

LONGER SERVICE: Treated timbers and ties usually outlast untreated timbering 5 to 9 times! "CZC" makes them more durable, better able to withstand continued usage.

Find out how "CZC"-treated timbering can result in greater safety and lower operating costs in your mine. Write to E. I. du Pont de Nemours & Co. (Inc.), Grasselli Chemicals Department, Wilmington 98, Delaware.

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1. Resist decay
2. Reduce fire hazards
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WOOD PRESERVATIVE

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BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

Three Miners Die in Illinois Explosion

Three men were killed and two others slightly burned Aug. 14 in an explosion in the Orient No. 2 mine of the Chicago, Wilmington & Franklin Coal Co. near West Frankfort, Ill. The mine employs 1,100 men, but only seven were working in the area when the blast occurred. Harold L. Walker, state superintendent of mines and minerals, stated that the blast "probably was a local gas explosion."

•

New Laboratory to Combat Dust Blasts

A new $45,000 laboratory to analyze coal and rock dust was completed Aug. 3 in the basement of the state capitol building in Charleston, W. Va., according to an announcement by Arch J. Alexander, chief, Department of Mines. Aim of the department is to assemble data on the "flash points" of all coal seams mined in West Virginia and to determine the proper rock-dust treatment for each. The fully-equipped laboratory also will test air samples for oxygen content. Joseph Bierer, administrative assistant to Mr. Alexander, is supervisor for the new project.

•

Township Abandons Plan For Anthracite Tax

A proposal to levy a 10c tax on anthracite tonnage in Coal township, Northumberland County, Pa., has been abandoned because the tax would price local tonnage out of a competitive market and because machinery to collect the tax would be cumbersome. The Township school board had imposed the tax in July to help pay mounting school costs under terms of a tax bill enacted by the Pennsylvania legislature last spring. Opposition to the tax was expressed by officers of the Susquehanna Collieries Co. and the Northumberland County Taxpayers' Association.

•

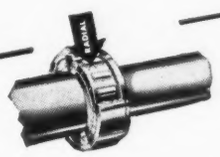
Preparation Facilities

Clinchfield Coal Corp., Elk Creek mine, Barbour County, West Virginia —Contract closed with Fairmont Machinery Co. for coal-preparation plant using a 15-ft.-diameter Chance Cone for cleaning 6x⅛-in.; facilities provided for loading five different sizes, with provisions for remixing the slack size with any of the other four sizes being loaded; capacity, 400 t.p.h, run-of-mine.

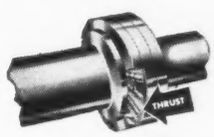
Clinchfield Coal Corp., Meade Fork mine, Wise County, Virginia—Contract closed with Fairmont Machinery Co. for coal-preparation plant using a 15-ft.-diameter Chance Cone for cleaning 10x⅛-in.; facilities provided

Why RIGHT ANGLE LOADING ASSURES LONGER BEARING LIFE

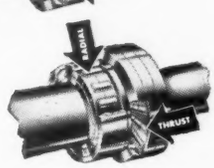
Right Angle Loading splits compound loads into the two component parts of pure radial and pure thrust . . . and carries each of these components on separate bearing assemblies.



- When the load is pure radial, it bears at a right angle to the rollers.



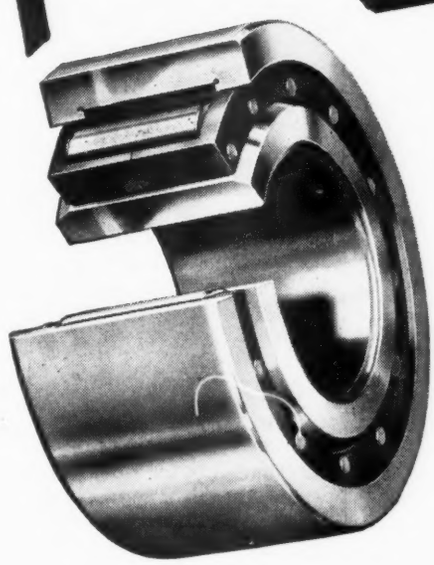
- When the load is pure thrust, it bears at a right angle to the rollers.



- When radial and thrust are combined the two loads are resolved separately at a right angle to the rollers.

ROLLWAY

RIGHT-ANGLE-LOADED BEARINGS



Reduce shut-downs and maintenance costs

They prevent wedging of rollers and pinch-out. Reduce roller end-rub with its wearing friction. Eliminate complicated stresses. Substantially reduce unit pressures. Eliminate compound or oblique loads, and the resultants of oblique loads. Carry greater radial or thrust load capacity in any given dimension. Assure greater resistance to shock loads and vibration. Give longer life expectancy.

FREE SERVICE!

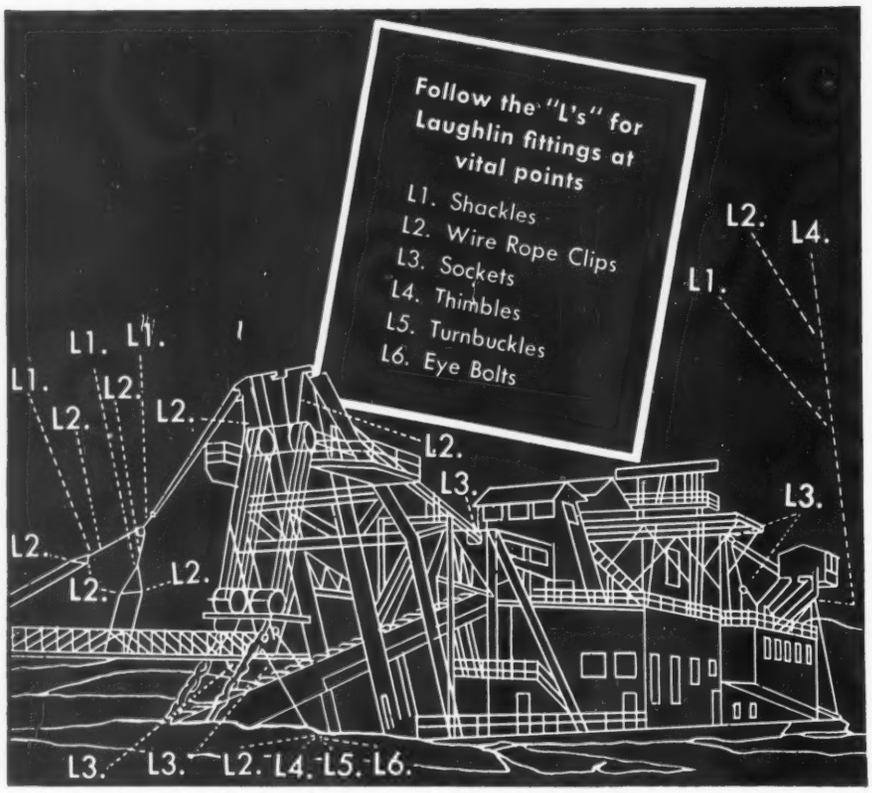
Send us a print or detailed statement of load, speed and operating conditions for free analysis and recommendation. Your information is held confidential.

ROLLWAY BEARINGS

ROLLWAY BEARING COMPANY, INC., SYRACUSE, N. Y.

SALES OFFICES: Philadelphia • Boston • Pittsburgh • Cleveland • Detroit • Chicago • Minneapolis • Houston • Los Angeles

GUARD THESE POINTS FOR OVER-ALL ECONOMY



Wherever you use wire rope or chain you'll gain these extra advantages by specifying Laughlin quality fittings:

IN ECONOMY

The expense and delay of ordering "specials" are eliminated. You'll find the fittings you want are usually ***standard*** in Laughlin — the most complete line. Stronger because they're ***drop-forged*** and weldless, they'll outlast the wire rope. And 3 Laughlin "Fist-Grip" clips will do the work of 4 ordinary U-bolts.

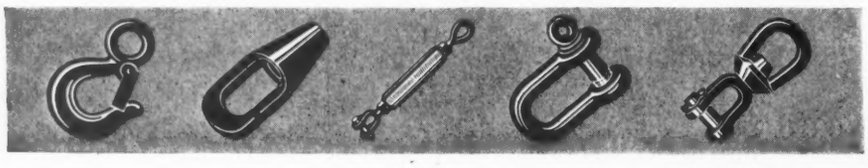
IN PROTECTION

Lives, loads and equipment are safeguarded by Laughlin Safety Hooks and Safety Clips. Every Laughlin fitting is designed to protect your wire rope and chain — to bear its full share of the load and grip without crushing.

Your costly mining equipment needs the ***distributed*** protection of always dependable wire rope and chain fittings. Laughlin fittings provide that protection, with added economy and trouble-free service. For a complete catalog write to Dept. 6, THE THOMAS LAUGHLIN COMPANY, Portland 6, Maine. Laughlin fittings are distributed through mill, mine and oil field supply houses.

LAUGHLIN

THE MOST COMPLETE LINE OF DROP-FORGED WIRE ROPE AND CHAIN FITTINGS



for loading five different sizes, with provisions for remixing the slack size with any of the other four sizes being loaded; crushing facilities provided for reducing the 3x1-in. to minus 1-in.; capacity, 400 t.p.h., run-of-mine.

Pittsburgh Coal Co., Mathies mine, Courtney, Washington County, Pa.—Contract closed with Fairmont Machinery Co. for coal-preparation plant cleaning the 8x⅜-in. in two 13½-ft.-diameter Chance Cones; equipment provided for loading four sizes, with conveying equipment for the ⅜x0-in. to the power plant, for loading on the river and for conveying various sizes to retail storage bins; capacity, 825 t.p.h., run-of-mine.

Kopenhaven & Deitrich Coal Co., Shamokin, Pa.—Contract closed with Wilmot Engineering Co. for one Type "D" Wilmot Simplex jig to prepare stove coal; feed capacity, 20 t.p.h.

Indian Run Coal Co., Cressona, Pa.—Contract closed with Wilmot Engineering Co. for four 2½-ft.-diameter Wilmot Hydrotators to prepare buckwheat No. 1, rice, barley and No. 4 coal; total feed capacity, 70 t.p.h.

Locust Valley Coal Co., Mahanoy City, Pa.—Contract closed with Wilmot Engineering Co. for two 3½-ft.-diameter Wilmot Hydrotators to prepare buckwheat No. 1 and rice; total feed capacity, 60 t.p.h.

Live Oak Coal Co., Minersville, Pa.—Contract closed with Wilmot Engineering Co. for one 2½-ft.-diameter Wilmot Hydrotator to prepare pea coal; total feed capacity, 30 t.p.h.

Schrader Coal Co., Minersville, Pa.—Contract closed with Wilmot Engineering Co. for one 3-ft. Wilmot hydroseparator to prepare buckwheat No. 1 coal; feed capacity, 30 t.p.h.

Ashland Hydrotator Coal Co., Ashland, Pa.—Contract closed with Wilmot Engineering Co. for two Type "A" Wilmot Simplex jigs to prepare stove and nut coal, total feed capacity 30 t.p.h.; and two 2½-ft.-diameter Wilmot Hydrotators to prepare pea and buckwheat No. 1 coal, total feed capacity, 40 t.p.h.

Rough River Coal Co., Centertown, Pa.—Contract closed with McNally-Pittsburgh Mfg. Corp. for tipple and washer reconstruction and modernization, including one McNally-Norton rewasher and one McNally-Carpenter centrifugal dryer to centrifuge ⅜-in. x½-mm.; plant to crush and screen run-of-mine at 7-in. for washing at 350 t.p.h.; hand picking provisions for plus 7-in. with boney material crushed for washing along with the retreated middlings; washed products screened at 7x3, 3x1¼, 1¼x¾ and ¾x½, with raw-coal provisions for loading 7-in. minus.

Sentry Coal Mining Co., Rockport, Ky.—Contract closed with McNally-Pittsburgh Mfg. Co. for transfer of

This Number stands for Efficient Truck Service

● It's the muster of Mack branches and dealers --707 strong--a far-reaching network we've set up throughout the United States and Canada for sales and service on Mack trucks.

It includes 67 Mack direct-factory branches strategically located in main industrial and trading areas. Each is manned by factory-trained experts who are constantly kept informed of improved service methods. Each is equipped with specialized Mack service tools that assure time-saving, money-saving precision work. And each is stocked with genuine high-quality Mack parts--parts that fit better and wear longer.

In more than 600 other communities Mack dealers--selected and responsible leaders in their field--also stand ready to give fast, on-the-spot service to Mack owners.

This means that no matter where your Macks may roll--there's always a source of authorized service and factory-made parts within easy reach.

It didn't just happen that way. We planned this service network as carefully as we plan every nut and bolt in a Mack truck.

Macks are built to need less service than other trucks. Our organization is built to make that service easy to get.

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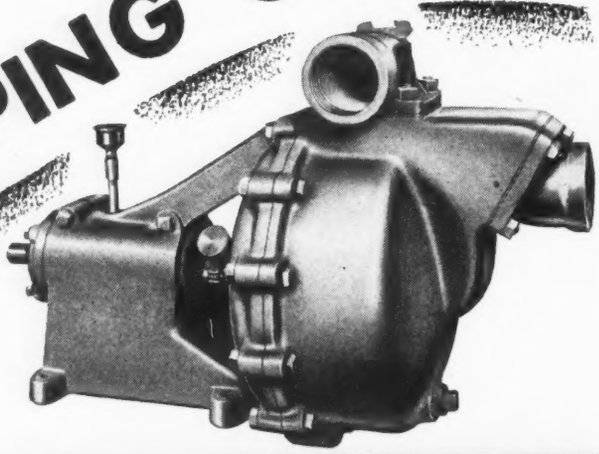
since 1900, America's hardest-working truck

Mack Trucks, Inc., Empire State Building, New York 1, New York. Factories at Allentown, Pa.; Plainfield, N. J.; New Brunswick, N. J.; Long Island City, N. Y. Factory branches and dealers in all principal cities for service and parts. In Canada, Mack Trucks of Canada, Ltd.

Trucks for every purpose

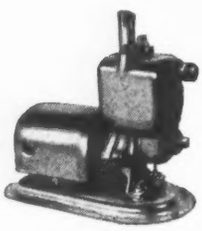
6019

REDUCE PUMPING COSTS!



Gorman-Rupp
Model 9361
Mine Gathering Pump
Largest of five sizes,
pumps 125 GPM at
100 ft.

Pump More Water for More Continuous Hours at Lowest First Cost and Maintenance



Gorman-Rupp
Mine Spray Pump
Delivers 8 GPM at 40 lbs.
Max. Capacity 16 GPM
Max. Pressure 50 lbs.

Gorman-Rupp self-priming centrifugal pumps have been specially engineered from every standpoint to meet specific mining requirements.

MINE GATHERING - These husky mine gathering pumps pump 24 hours per day, continuous operation, for long periods of time without attention. They are guaranteed to self-prime at a maximum static suction lift of 25 feet. Because of the air handling ability of Gorman-Rupp pumps a positive suction is maintained and by actual test will prime in less than three and one half minutes with one hundred feet of 2" suction line.

COAL DUST CONTROL - The Gorman-Rupp mine spray pump is a tiny, all bronze pump weighing only 27 lbs. Exceedingly valuable for coal dust control and any number of other uses. Fitted with pipe or common garden hose, it will lift water up to 25 feet. It delivers 8 GPM at 40 lbs. pressure. Equipped with Lamb Electric ½ HP universal type electric motor, 110/115 volt AC of 60 cycles or less, or DC.

Special information has been prepared for mine applications. Write for your copy today.

THE GORMAN-RUPP COMPANY
306 BOWMAN STREET, MANSFIELD, OHIO

Distributed by: Guyan Machinery Co., Logan W. Va. — Weinman Pump & Supply Co., Pittsburgh, Pa. — McComb Supply Co., Harlan, Ky. — Bittenbender Co., Scranton, Pa. — Industrial Supply Co., Terre Haute, Ind. — Hoe Supply Co., Christopher, Ill. — Central Supply Co., Greenville, Ky. — Ebbert & Kirkman Co., Inc., Birmingham, Ala. — Henszey Co., Watertown, Wisc. — Union Supply Co., Denver Colo. — Mill & Mine Supply Co., Birmingham, Ala.

existing Sentry plant from Madisonville, Ky., to Rockport, Ky.; with expansion of present washing capacity by additional McNally-Norton washing equipment to handle 800 t.p.h. run-of-mine input; plant will reduce all run-of-mine to 7-in. with new McNally-Pittsburgh heavy-duty double-roll breaker; middlings in the raw crushed run-of-mine will be retreated.

H. C. Frick Coke Co., Robena mine, Greene County, Pennsylvania—Contract closed with Allegheny Industrial Electrical Co., Pittsburgh, Pa., by Dravo Corp., contractor for the plant, for complete electrical installation expected to begin late this summer, to include interior and exterior light and power wiring at a reported cost of $150,000.

Rich Hill Coal Mining Co., Hastings, Pa.—Contract closed with Jeffrey Mfg. for tipple; capacity, 300 t.p.h., raw-coal feed, run-of-mine.

Kelley's Creek Colliery Co., Mine No. KC-35, Ward, W. Va.—Contract closed with Kanawha Mfg. Co. for slope-belt-conveyor installation delivering coal and mine rock from new mine to existing tipple at No. 2 mine; consists of reversible trip feeder capable of handling 50-car trips, inbuilt track scale with automatic recorder, power rotary dump, motorized rock gate underneath dump, 13-ton-coal and 70-ton-rock bins, individual reciprocating feeders for coal and rock, shock-pad belt conveyor to transfer coal or rock to main slope conveyor, 3 ft. wide x 1,232 ft.-long main slope conveyor on 16-deg. inclination, picking and crushing facilities for coal at head end, and rock-disposal system consisting of a 3½ ft. x 112 ft.-long belt conveyor to 125-ton truck bin; all housed in steel structure; capacity, 300 t.p.h.

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Coal Publications

Rome Cable Manual of Technical Information. Rome Cable Corp., Rome, N.Y., 1947. 263 pp. 51/8x7¾-in.; imitation leather. $2.50. Reference book on wire and cable problems for electrical engineers and wire specialists. Includes technical tables, engineering calculations, audio- and radio-frequency wire and cable data, National Electric Code information, mathematical and conversion tables and properties of materials.

Directory of Member Institutions and Review of Current Research, 1947. Engineering College Research Council of the American Society for Engineering Education. University of Iowa, Iowa City. 103 pp. 6x9-in.; paper. $1. Research in coal utilization, heating and ventilating, heat transfer and home design is being carried on in nearly half of the universities and technical schools listed.

Very Popular PROTECTION...

Pleasant to wear . . . pleasing to look at and offering maximum protection—that's the new AO Ful-Vue Acetate Goggle. In chemical and electrical work and operations where the tiniest spark may cause fire or explosion, these goggles are literally worth their comfortable, light weight in gold.

Features include side shields, if desired, for protection against particles striking laterally . . . shield ventilated to minimize fogging of lenses . . . Ful-Vue lenses that conform to eye orbit . . . no hinges and temples in line of vision. Comfort benefits are nose pads which distribute goggle weight evenly, and the face-formed new bridge. Your nearest MSA Representative can supply you with this popular goggle with clear or Calobar lenses.

*** RECOMMENDED USES:**

NEW AO Ful-Vue Acetate Goggles with Side Shields

CLEAR LENSES — For protection against foreign particles on operations such as chemical and physical lab work, chipping, grinding, riveting, machine and hand tool work, spot welding, bottling.

CALOBAR LENSES — When above operations also involve danger from glare, heat, ultra-violet and infra-red radiations. Also for welders' helpers and others adjacent to welding operations, railroad workers, truck and bus drivers, etc.

Safety Division

American AO Optical COMPANY

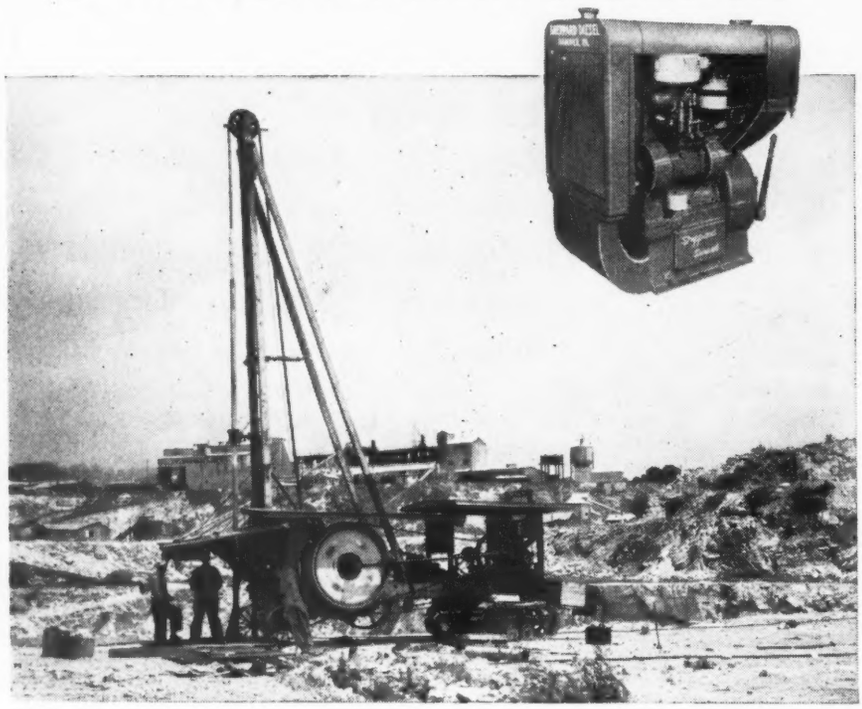
SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES

"Four of a Kind"

. . . a "Blue Chip" Bet

to REDUCE DRILLING COSTS

at Thomasville Stone & Lime Co.



Four 18 H.P. Sheppard Diesels are taking over the job of powering churn drills at Thomasville Stone and Lime . . . replacing four 20 H.P. gasoline engines. As a result of the low-cost, dependable operation of these Sheppard Diesels another order has been placed for a larger Sheppard to be installed in a power shovel.

The Model 13D, Sheppard engines being used in the drills are 2 cylinder full diesels rated at 18 H.P. for continuous operation at 1200 R.P.M.—with plenty of reserve power when the going gets tough. They are the product of a company which has pioneered in the development of small diesel engines. Their design has been simplified to the greatest degree yet achieved by diesel engineering . . . maintenance and servicing are a simple matter for any average mechanic. They start and operate efficiently on low-cost domestic furnace oil.

It's a better than even bet that you can reduce power costs by switching to Sheppard Diesels. A 3¢ stamp is all it takes to "see." Write for complete specifications—don't forget to state H. P. requirements.

R. H. SHEPPARD COMPANY, INC.
11 Middle St., Hanover, Pa.

Sheppard DIESEL

DIESEL'S THE POWER . . .

Sheppards' the Diesel

Power Units - 3½ to 62 H.P.—Generating Sets - 2,000 to 36,000 watts

What Makes Workers Work? by James F. Lincoln. Liberty Library, Fair Lawn, N. J., 1947. 32 pp. 3⅞x-9¾-in.; paper. 25c.; quantity prices on request. Reprint of an address on changing aspects of labor relations by the president of the Lincoln Electric Co., followed by a question-and-answer period on the Lincoln Incentive System.

Use of Rock Dust and Water Under the Federal Mine Safety Code in Limiting Coal-Dust Explosions, by J. J. Forbes and C. W. Owings. I. C. 7421. U. S. Bureau of Mines, Washington 25, D. C. 12 pp. 8x10½-in.; paper; mimeo. Free. A summary of data on rock-dusting and use of water in allaying the coal-dust hazard.

Management and Human Relations in Industry, Vol. I, edited by Paul Anderson. The Industrial Relations Publishing Corp., New York. 103 pp. 8½x11-in.; paper. $2. A collection of 25 papers by recognized authorities discussing human relations, the Lincoln Incentive System, industrial leadership, collective bargaining, industrial economics and strikes and the basic freedoms.

Trends in Coal Utilization, by F. H. Reed, G. R. Yohe, O. W. Rees and H. W. Jackman. Circular No. 128, State Geological Survey, Urbana, Ill. 27 pp. 8½x11-in.; paper. Free. Trends in use of coal and competitive fuels for home heating, power generation, locomotive firing and coke manufacture. Long-range research toward conversion of coal to liquid and gaseous fuel is urged.

Dust Problems in the Mines of the Pennsylvania Anthracite Region, by L. H. Johnson. U. S. Bureau of Mines, T. P. 704. 15c., Supt. of Documents, Government Printing Office, Washington 25, D. C. A three-year survey in 38 anthracite collieries shows that adequate ventilation and liberal use of water sprays can control coal-dust hazards and protect workers from anthracosilicosis. Other subjects include dust sampling and analysis, use of wet-type pneumatic drilling machines, removal of dust from roadways and use of water to fight mine fires and remove harmful gases from blasting.

The Management Leader's Manual, for Operating Executives, Supervisors and Foremen, No. 1, edited by J. O. Rice and M. J. Dooher. American Management Assn., 330 W. 42d St., New York 18. 192 pp. 6x9½-in.; imitation leather. $3; quantity prices on request. Twenty-two studies collected from earlier A.M.A. publications on management's relations with individuals and groups of workers. Subjects include management leadership in a democracy, human-relations responsibilities, interviewing and counseling techniques, safe and efficient production, tests for management leaders and simplification of human-relations work.

★★★

MORE CAPACITY

for Shuttle Cars

. . . BUT NO MORE WEIGHT

Coal mine shuttle cars typify today's trend toward higher capacities for mechanized units. But, more capacity means little if it increases mobility-stealing weight.

Republic High Strength Steels can help you increase capacity . . . safely . . . *without increasing weight.*

Here's how it is done:

These steels offer more than high strength —a minimum yield point of 50,000 pounds. They also are 4 to 6 times more resistant to atmospheric corrosion than ordinary structural steels in the unstressed condition. They resist abrasion.

So . . . you can use them in thinner, weight-saving sections that are as strong and durable as heavier sections of carbon steel. High strength protected by corrosion-resistance allows you to trade non-productive weight for coal-carrying volume.

For best results, Republic gives you a choice of three *different* high strength steels—Republic ALDECOR, Republic COR-TEN and Republic DOUBLE STRENGTH—in plates, sheets, strip and bars. And booklet No. 445 will give you the complete story on these three steels. Write for it.

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HIGH STRENGTH STEELS
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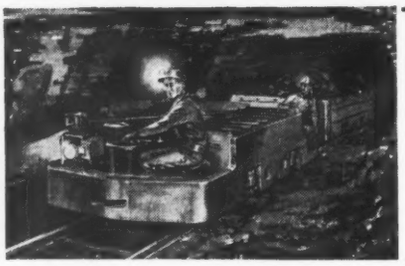
Other Republic Products include Carbon, Alloy and Stainless Steels—Sheets—Plates—Pipe—Bars—Wire—Bolts, Nuts and Rivets



Equipment News

More Detailed Information and Descriptive Literature Normally Are Available on Request Directly to the Manufacturer

Headlight

A new, smaller mine-machinery or locomotive headlight using a specially designed lamp similar to the automobile sealed-beam type and casting a beam more than 500 ft. ahead has been announced by the Westinghouse Electric Corp., Pittsburgh 30.

Two models are available, the Type P for use on locomotives or mine machinery requiring Bureau of Mines equipment approval, and the Type NP for general haulage locomotives and mine machinery in non-hazardous locations. A special lens is available for the Type P unit that diffuses and spreads the beam for face operations or where wider beam spread is required. Both models are said to be built for heavy-duty service. The 150-watt lamp is suspended within the headlight on a spring-suspension system that acts as a shock absorber and the reflector is sealed in the bulb of the lamp. The new lamp gives several times the length of service at greater brilliance than any of its predecessors, according to the manufacturer.

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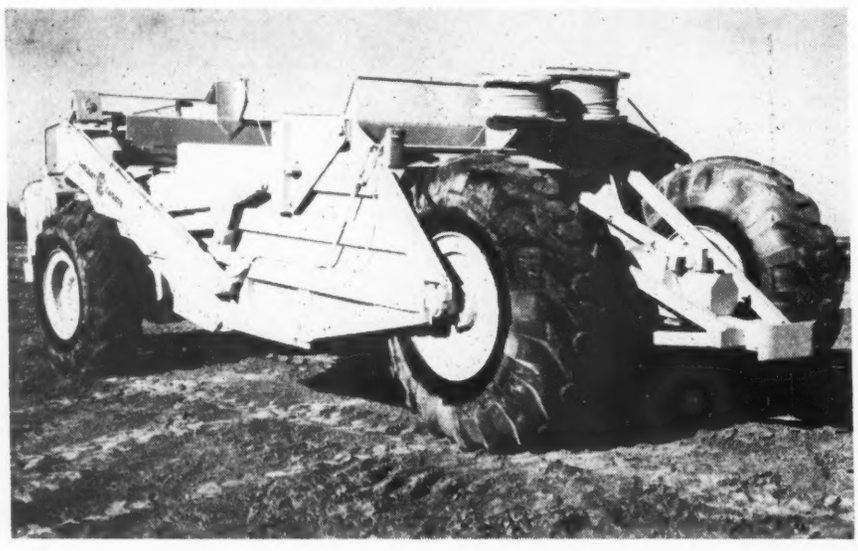
Earthmover

The first addition to its new line of rubber-tired tractors and allied earthmoving units, the "Moto-Scraper," has been announced by LaPlant-Choate Mfg. Co., Cedar Rapids, Iowa. According to the company, the Moto-Scraper is a modern high-speed tractor-scraper combination consisting of a two-wheeled rubber-tired tractor, joined to a 17½-yd. scraper

by a pedestal-hitch assembly to form a single, integral self-propelled unit. It is designed for digging, loading, transporting and spreading material on either long or short hauls.

The Tractor is equipped with a 225-hp. diesel engine and extra-large 21:00x29 tires, for maximum traction and flotation. It has four speeds forward and one reverse. Top travel speed is 18 m.p.h. with an engine r.p.m. of 1,800. The scraper is a positive forced-ejection type, operated by a LaPlant-Choate air-actuated cable power-control unit mounted on the rear of the tractor and deriving its power from the main engine. Steering of the unit is accomplished by two double-acting hydraulic jacks, positively controlled by an LPC Fluid-Power Unit mounted on the front of the tractor, the company states.

The unit is equipped with air-actuated four-wheel brakes, with controls arranged so that braking power can be applied to the scraper wheels alone or to the complete unit. The Moto-Scraper has a length of 34 ft. 10 in., a width of 11½ ft. and a height of 9 ft. 8 in. It weighs 42,500 lb. The wheel base is 21½ ft. and it has a level turning radius of 27 ft. For maximum traction and maneuverability, approximately 70 percent of the empty weight of the unit is concentrated on the front axle.



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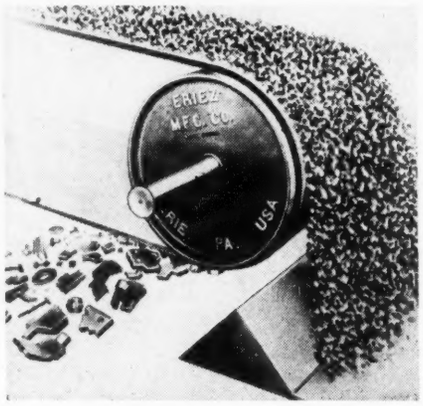
Magnetic Pulley

A new magnetic pulley, said to be the first completely self-energized unit requiring no electric current to generate a magnetic field, has been announced by Eriez Mfg. Co., Erie, Pa. This pulley is adaptable to all applications requiring automatic separation of magnetic from non-magnetic materials conveyed on a belt and, according to the manufacturer, is particularly suited to underground installation.



The unit will work effectively through belts of rubber, canvas, leather or any other non-magnetic material, thereby performing automatic separation, it is said, and neither intense heat, rain or sudden temperature changes affect its magnetic efficiency. Powered by giant Eriez Alnico-alloy magnets, the unit is said to operate at top efficiency always, since the permanent magnetic strength is not affected by electric-current variations and operation and maintenance costs are virtually eliminated.

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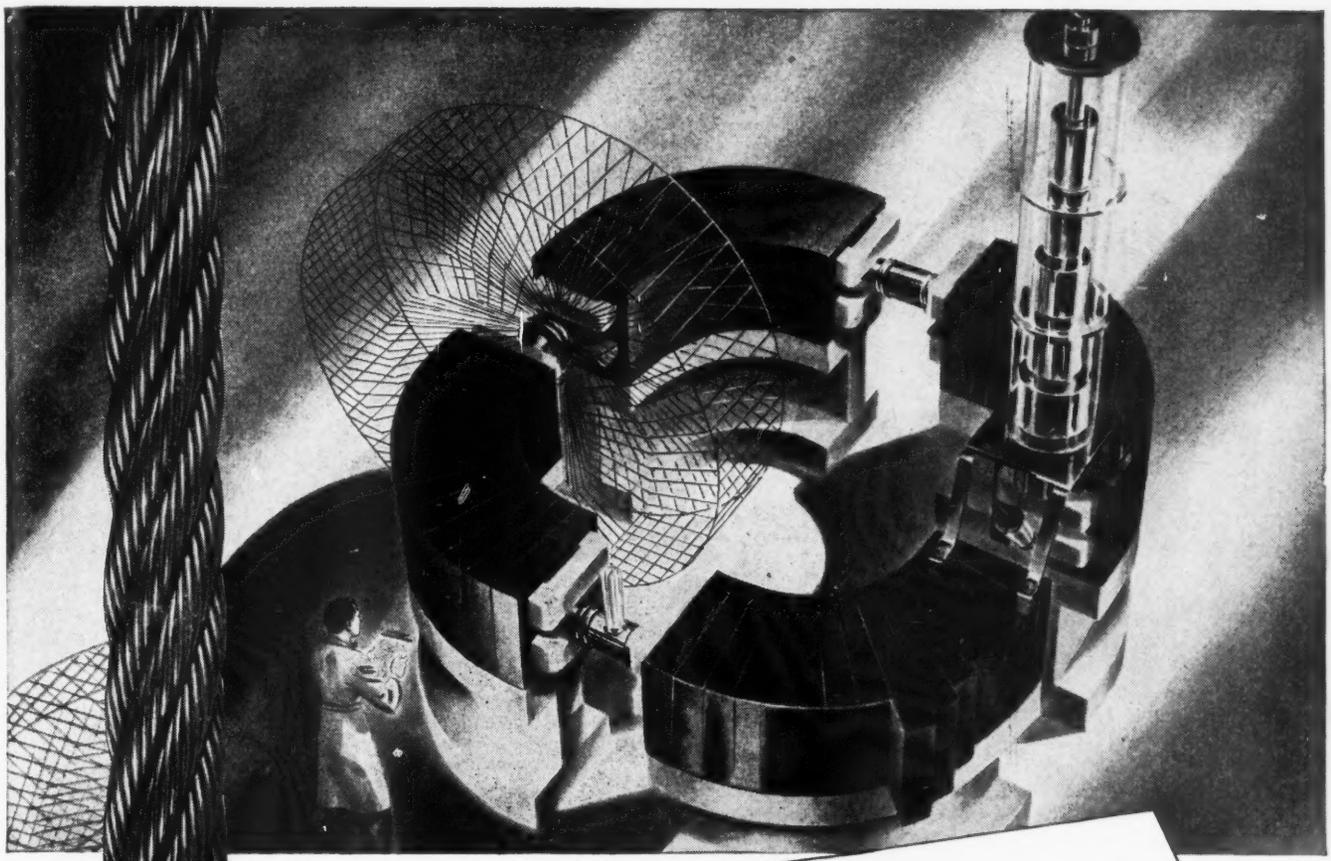
Carbon-Monoxide Tester

The N.B.S. carbon-monoxide indicator, developed and manufactured during the war by the National Bureau of Standards, is to be soon avail-



Precisionbilt LIKE A SYNCHROTRON*...

J&L WIRE ROPE

PERMASET PREFORMED

Like a synchrotron,* J&L Precisionbilt Wire Rope is made to do its work and do it well. And, just as men of science look to the future J&L men are planning and working to produce an even better wire rope for you—wire rope that will give you increased service and reduce your maintenance costs. Specify J&L Precisionbilt Wire Rope for your equipment.

**A 300 million-volt synchrotron that will produce energy similar to that of cosmic ray particles is being constructed by scientists. It will go a step beyond atom-smashing to study sub-nuclear particles.*

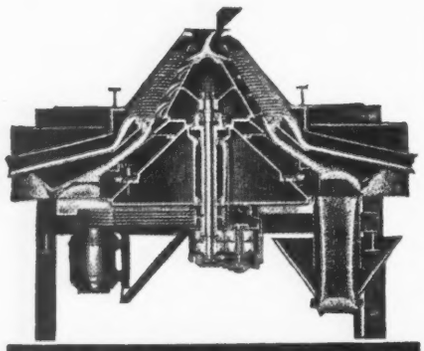
J&L STEEL

JONES & LAUGHLIN STEEL CORPORATION

GILMORE WIRE ROPE DIVISION

PITTSBURGH 30, PENNSYLVANIA

J&L *Precisionbilt* PERMASET PRE-FORMED WIRE ROPE



"C-M-I"

CONTINUOUS CENTRIFUGAL dryer

reduces the moisture content of the smaller sizes so low that troubles caused by clogged cars, spouts and chutes are eliminated and the product is also suitable for blending. Users tell us that by the installation of these "C-M-I" dryers they have kept their customers satisfied and also expanded their markets.

CENTRIFUGAL AND MECHANICAL INDUSTRIES, INC.

146 PRESIDENT ST., ST. LOUIS 18, MO.

able from the U. S. Safety Service Co., Kansas City 6, Mo., under a manufacturing license issued by the government. The detector is about the size of a pencil and was used extensively during the war to detect poisonous fumes in plane cockpits, tanks, etc. Said to be the most sensitive instrument of its kind, the indicator will detect and closely estimate less than 1 part of carbon monoxide per 500 million parts of air, providing a big safety factor over the one part of carbon monoxide in 10,000 parts of air needed to affect the human system.

The detector consists of a small glass tube sealed at both ends and a rubber bulb all packed into a small kit that fits into the pocket. When the presence of carbon monoxide is suspected, the kit can be opened, the tip broken off a small tube and one end inserted in the bulb to draw air samples through the chemicals in the tube. If carbon monoxide is present, the yellow chemicals will turn green in 30 sec. The darker the shade of green, the higher the monoxide concentration. A matching color chart tells how high the concentration is.

•

Truck Tire

A new premium "super" truck tire will all plies constructed of newly perfected nylon cords developed expressly for rugged truck-tire service has been announced by The Goodyear Tire & Rubber Co., Akron, Ohio, as the first truck tire of all-nylon plies introduced to the market. Goodyear tire engineers estimate that a 12-ply-rating all-nylon truck tire carcass has 50 percent greater strength than a 12-ply-rating tire of comparable size constructed of the best rayon tire cords yet developed. In addition, the all-nylon is said to be a lighter, more flexible truck tire that develops less heat in high-speed operations and will greatly improve bruise resistance under roughest operating conditions.

The new all-nylon truck tire provides greatly extended life of the cord carcass and consequently will be suitable for more recapping than the common cotton or rayon-cord truck tires, the manufacturer states. First tire in the Goodyear line to incorporate all-nylon construction in all plies and cushion is the Hi-Miler Xtra Tred, designed for long-distance high-speed service.

•

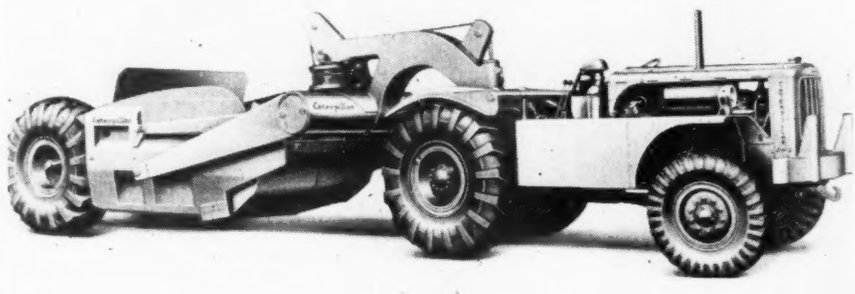
Earthmover

A new earthmoving team, with components match in design and power to assure maximum efficiency of operation and working ability, has been announced by the Caterpillar Tractor Co., Peoria, Ill. It consists of a new Caterpillar diesel DW10 wheel-type tractor, a new Caterpillar No. 10 scraper and a new Caterpillar No. 21 cable-control unit. This latest product development utilizes the power increase said to be available in the DW10 tractor, which now has an output of 115 hp. at 1,800 r.p.m. Operating with auxiliary equipment, the unit takes on a wider range of heavy off-road jobs and high-speed hauls.

Notable advantages of the new DW10 over the predecessor model are outlined by the manufacturer as follows: A 15-percent increase in power output through application of the new six-cylinder Caterpillar diesel engine; constant-mesh transmission with helical gears in all but low and reverse, with five forward speeds; self-adjusting clutch brake to facilitate gear shifting; steering aided by a shockless, worm-and-ball nut-type control integral with hydraulic booster; heavy duty, air-actuated, mechanically-operated brakes with 18-in. brake drum and 7-in. shoes.

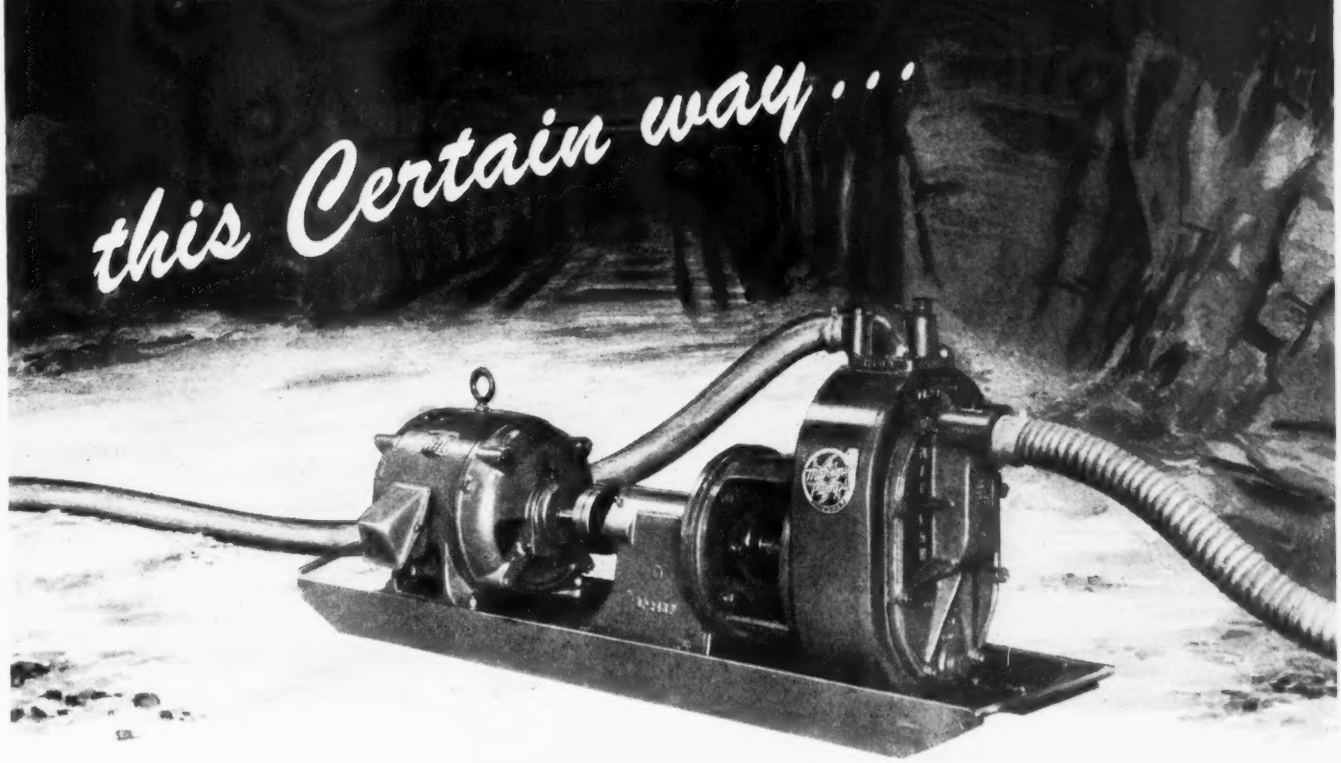
Top speed of the unit with loaded wagon and scraper is 18.8 m.p.h. with standard transmission and 21.6 or 24.5 with optional transmissions when equipped with 21.00x25 tires. When using 18.00x25 tires, top speeds of 17.6, 20.2 or 22.9 m.p.h. are developed.

The new Caterpillar No. 10 scraper is designed exclusively for use with the new tractor, has a heaped capacity (at a 1:1 slope) of 11 cu. yd. and embodies the many Caterpillar features. The new Caterpillar No. 21



DRAIN MINES CHEAPER

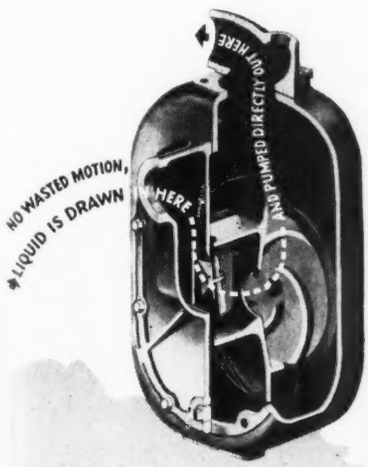
this Certain way . . .



MARLOW MINE GATHERING PUMPS

Move More Water per Horsepower

It takes *less power* to dewater with a Marlow—because Marlows move more water per horsepower than any other mine gathering pump. Exclusive free-flow design and patented stationary diffuser are two of the reasons why. And a Marlow pump *stays* highly efficient even after impeller vanes have become worn from excessive abrasion . . . another reason Marlows are preferred by many of the country's largest mines—both sweet and acid water.



Marlow Mine Gathering Pumps are completely self-priming on suction lifts up to 25 feet. Two- and three-inch sizes, sled-type base or rubber tired tricycle models. Bulletin EM46 gives details. Bulletin G46 describes other Marlow centrifugals that help cut strip mine drainage costs. Write for this informative literature and name of Marlow distributor nearest you.

MARLOW PUMPS 548 GREENWOOD AVENUE RIDGEWOOD, NEW JERSEY

Manufacturers of Quality Pumps Since 1924

IT'S EASIER AND QUICKER

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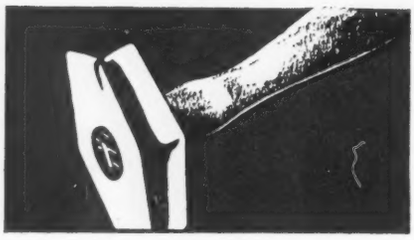

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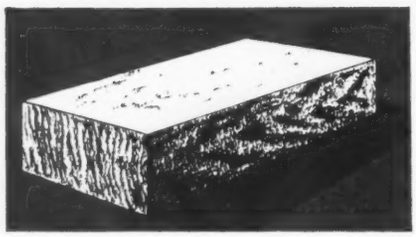

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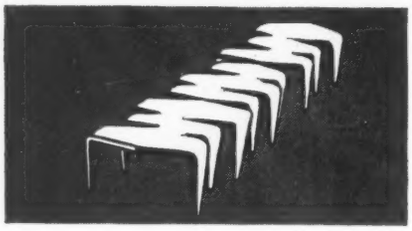

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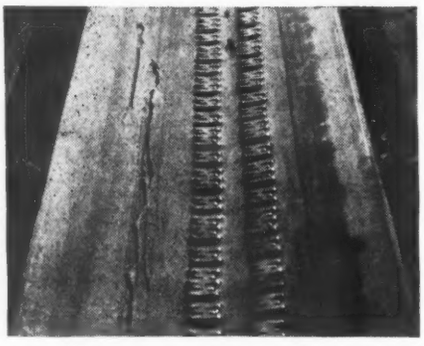

BRISTOL'S BELT LACING

For rubber or woven conveyor belts up to $13/16$" thick.
Write for Bulletin 736.

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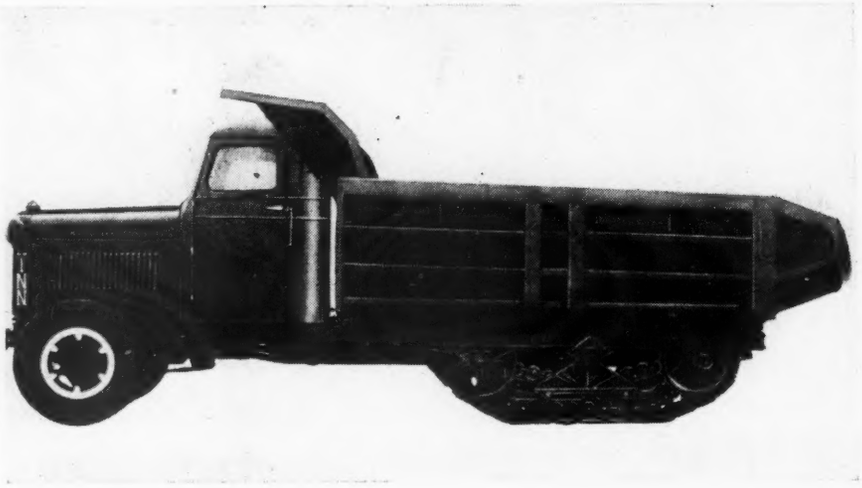


HALFTRACK—Designed for heavy-duty industrial haulage, the new Model D-15 Linn Haftrak has been announced by The Linn Mfg. Co., New York 19. The new model is said to feature full contour traction for maximum-engaged track area and increased stability; a new long traction unit for greater load capacity and track area; higher speeds; and either gasoline or diesel power. Specialized body styles, placed on the standard chassis, are available.

rear-mounted, double-drum cable control is matched to the requirements of the new tractor and scraper and line pulls are ample to meet the most severe service requirements imposed by scraper operation, according to the manufacturer.

•

Rock Bit

A new stud-type Jackbit, with an attachment member designated as the Jackstud, has been added to its line of rock-drilling equipment, Ingersoll-Rand Co., 11 Broadway, New York 4, has announced.

The bit has new, carefully worked out wing curves that enable it to retain new bit proportions through many resharpenings, according to the manufacturer. The resulting small gage loss permits using successive bits with reductions in diameter of 1/16-in. or less per change. This makes it possible to start holes with smaller bits than those previously used and still bottom them at the same size as before. Drilling speeds are consequently higher than before and the time consumed per hole is less, it is said.

The Jackstud, which connects the bit to the drill rod, is made of high-grade, carburized alloy steel selected to withstand this service and tests indicate that it is the strongest Jackbit attachment thus far devised, the company states. The Jackstud can be satisfactorily used with any drill steel, whether it is of the carbon or alloy type.

•

Crusher Reset

An automatic reset, simple in design and easy to install, which operates to discharge unbreakable material from the Type R reduction crusher, has been announced by the Allis-Chalmers Mfg. Co., Milwaukee, Wis.

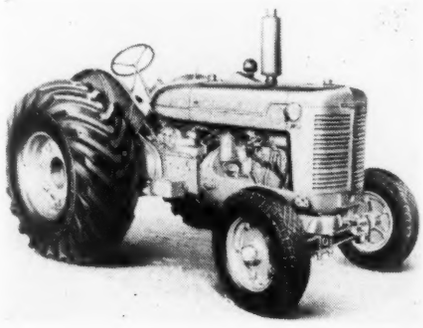
The new device is said to provide an automatic, positive method of resetting the crusher after the head has lowered and permitted the passage of unbreakable substances. When any such objects enter the crushing chamber, pressure in the hydraulic system is increased sufficiently to compress a gas-filled bag and oil enters the automatic reset's steel shell, permitting the crushing head to lower sufficiently to discharge the unbreakable material.

Following discharge of the material, the gas pressure in the bag forces the oil out of the automatic reset and the crushing head is returned to its operating position. The automatic reset functions entirely separate from the speed-set control, which is used by the operator to adjust the crusher, change product size, or compensate for wear on the crushing surfaces.

•

Single-Wheel Tractors

Designed to facilitate off-the-highway movement of scrapers, wagons, and trailers, the International Harvester Co., Chicago, has announced the development of single rear tires and wheels for its I-9 (55-hp. gasoline-engine) and ID-9 (52-hp. diesel-



...yet this TRANSITE PIPE drainage line has carried corrosive acid mine waters for over 11 years

Here is another example of the exceptional corrosion resistance of Transite* Pipe in mine service.

The Transite drainage line pictured here was installed more than 11 years ago in the Packer # 2 mine of the Weston-Dodson Coal Company at Lost Creek, Pennsylvania. Since then, it has been continually carrying corrosive acid mine waters. Today, it is still on the job . . . still saving many dollars in maintenance and replacements.

Such performance is not unusual. Our records contain many examples of Transite drainage lines that have served for years where the pipe formerly used had to be replaced every few months. Some of these "old timers" have even outlived the mines in which they were originally installed and have been moved to new locations to continue their long-term trouble-free service.

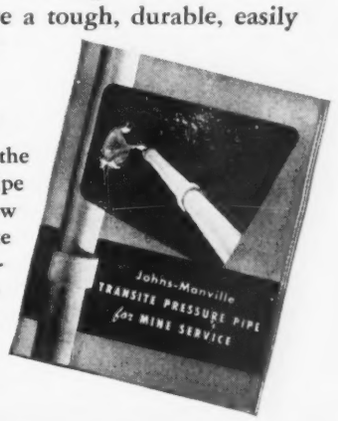
In other types of mine service too, this asbestos-cement pipe saves money for coal operators. For water supply lines, Transite offers the advantage of an unusually high carrying capacity—helps assure low pumping costs. Transite is also providing important economies for fire prevention ducts, for spray and return lines from condenser cooling towers, and for many other services where a tough, durable, easily installed pipe is required.

*Reg. U. S. Pat. Off.

SEND FOR FREE BOOKLET

For further details, send for the booklet "Transite Pressure Pipe for Mine Service." It tells how Transite can help you eliminate frequent replacements and reduce your pipe line maintenance. Write Johns-Manville, Box 290, New York 16, N. Y. for your copy.

JOHNS-MANVILLE JM PRODUCTS



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Insulating Tape
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1 Double grip . . . both sides adhesive.
2 Great tensile strength . . . tough.
3 Won't tear, ravel or pucker.
4 Resists abrasion.
5 Acid- and alkali-proof.
6 Extra thick . . . one layer insulates.
7 Exceeds A.S.T.M. specifications by 300% in adhesiveness, 26% in tensile strength, 290% in dielectric strength.

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INSULATING TAPE
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OPERATING EASE...
WITH
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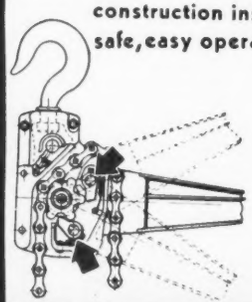
SAFETY-PULL HOISTS

Safety Pull Hoist Tightening Mine Trolley

Check these features that give longer hoist life, greater ease of operation—

- Hooks of drop forged heat treated steel
- Reversible handle permits operation in any position
- "Safety Load" handle—bends before other parts will break
- Each model pre-tested to 100% overload
- Coffing exclusive dual ratchet and pawl assembly for maximum safety
- Nine models in capacities from ¾ to 15 tons

Sturdy, simple pawl construction insures safe, easy operation.



Write for Bulletin RL-3
COFFING HOIST CO.
DANVILLE · ILLINOIS
RATCHET LEVER HOISTS • LOAD BINDERS • SPUR GEAR HOISTS • ELECTRIC HOISTS • DIFFERENTIAL HOISTS TROLLEYS

engine) industrial wheel tractors. This new arrangement, the company states, eliminates the objection voiced against dual wheels in off-the-highway hauling of trailing equipment, where in soft ground it is difficult for the single-tired equipment following in the track to stay in line.

With the new tire, it was pointed out, the trailed equipment follows the track of the tractor without incurring any difficulty in steering or other attendant operations. The new, large 18.00x26 single rear tires, at the same time, provide the same tread as the dual-tired units, as well as permitting maximum drawbar pull of 5,500 to 7,500 lb., it is said.

•

Welder

A new self-powered arc welder has been announced by Harnischfeger Corp., Milwaukee, Wis. The P&H Model WN-200 Welder, available as a stationary or trailer unit, is an N.E.M.A.-rated machine of 200 amp., but has a welding service range of from 30 to 260 amp.

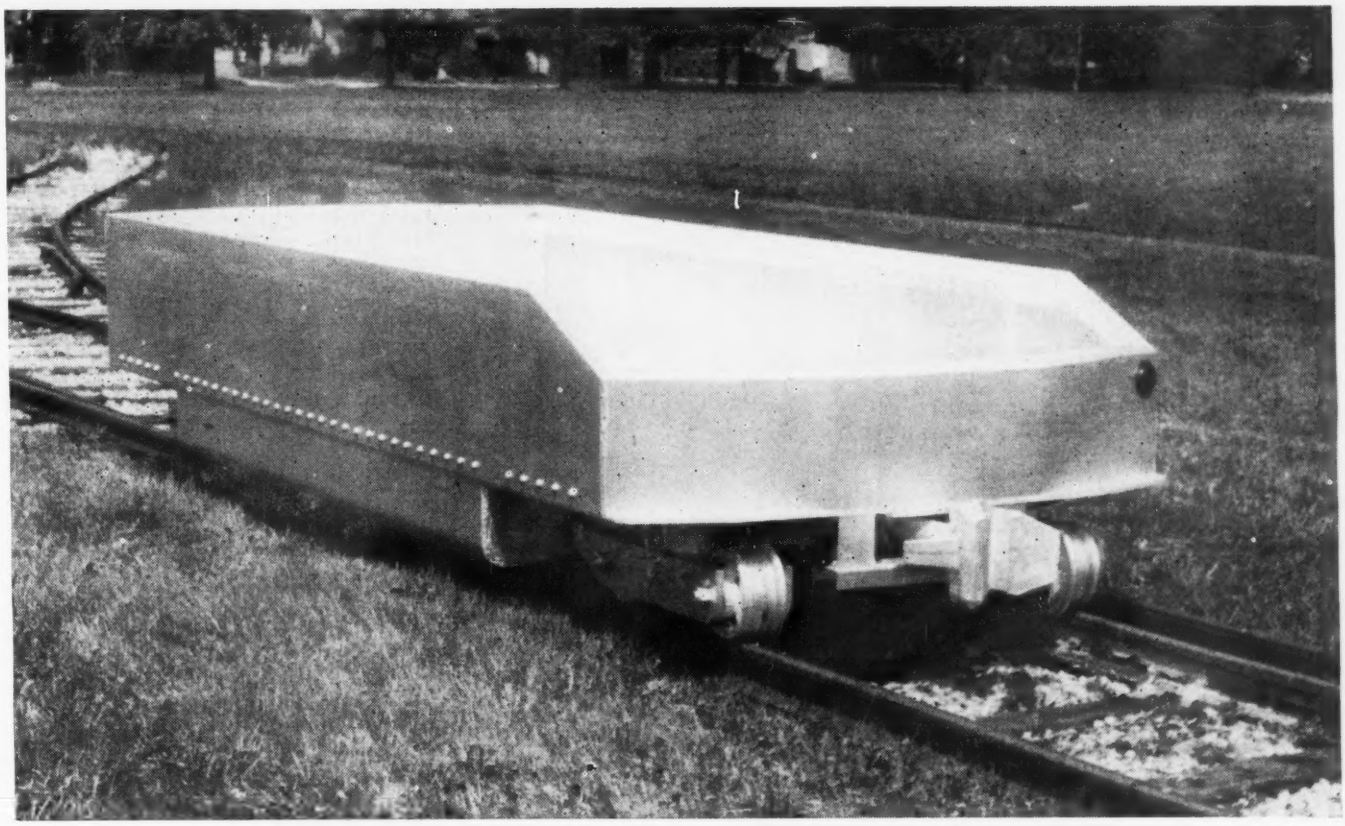
The trailer model is carried on a running gear of standard track width, and has standard-size pneumatic tires as regular equipment. Both models are equipped with P&H's square-frame arc-welding generators, and there is just one control for any desired welding heat from minimum to maximum capacity. Arc response is automatic on all classes of work and with all types of electrodes, according to the company. The new Model WN-200 also has the P&H "Visi-matic" calibration plates, which enable the operator to select instantly the exact welding current for each of the three classes of electrodes. The generator is rated 30 volts at 2900 r.p.m. A heavy-duty, four-cylinder air-cooled 26½-h.p. engine supplies power for both models.

•

Trade Literature
Available Without Charge on Request to the Manufacturer

Pumps—Allis-Chalmers Mfg. Co., Milwaukee 1, Wis. Bulletin No. 52B-6691 describes the operating advantages and construction features of the new line of "Pedrifugal" pedestal-type centrifugal pumps. It includes a pump, motor and Texrope-drive selection table and standard dimension tables for the pump, which is stocked and sold with or without motors.

Hydraulic Equipment and Oils—Shell Oil Co., Inc., 50 West 50th St., New York 20. Booklet, "Hydraulic Equipment," is a comprehensive review of hydraulic principles and problems and includes chapters on hydraulic principles, hydraulic systems and equipment, hydraulic-oil require-



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MAXIMUM CAPACITY

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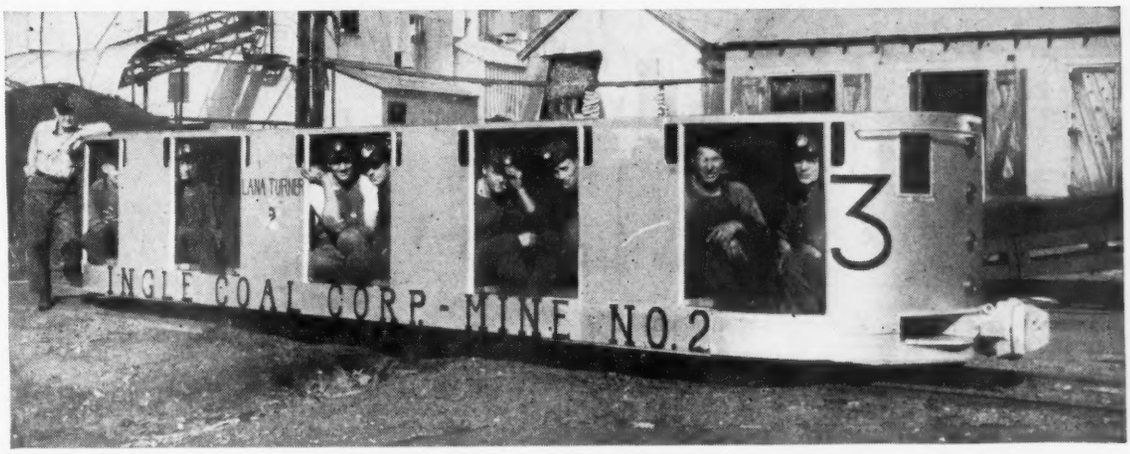
IN ADDITION TO MAXIMUM CAPACITY, DIFFERENTIAL OFFERS SIMPLICITY OF DESIGN, RUGGED CONSTRUCTION AND THE UTMOST IN ROADABILITY.



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Builders of Haulage Equipment Since 1915

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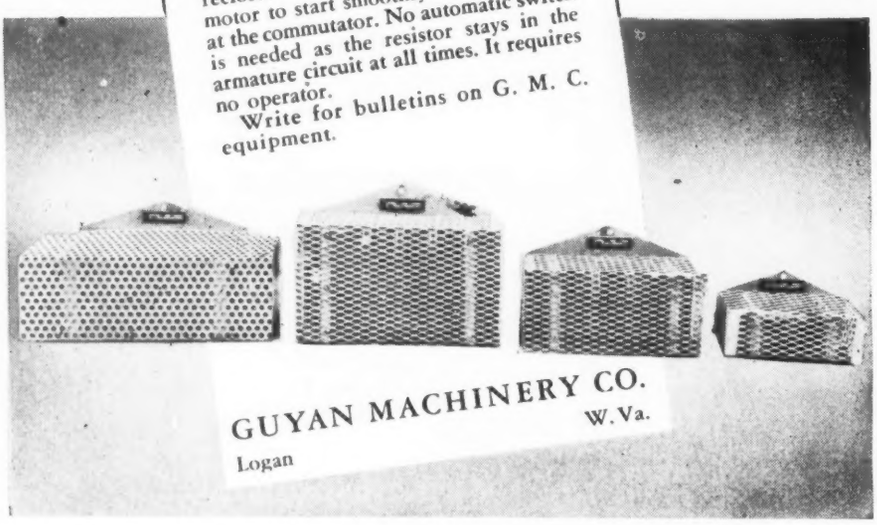
G.M.C. Choke Starting Resistances *for smoother starts with no arcing*

G. M. C. Choke Starters feature a resistance coil connected in series with the armature of a D. C. motor. Resistance is adequate to choke back the initial inrush of current when a motor is connected directly across the line, or when a circuit breaker has been out and recloses on the motor. This permits the motor to start smoothly with no arcing at the commutator. No automatic switch is needed as the resistor stays in the armature circuit at all times. It requires no operator.

Write for bulletins on G. M. C. equipment.



GUYAN MACHINERY CO.
Logan W. Va.

ments and performance characteristics, maintenance and cleaning of hydraulic systems.

Fire Hose—B. F. Goodrich Co., Akron, Ohio. Catalog section details the construction of the company's industrial fire hose for mill and plant protection and offers data on single- and double-jacket and rubber-covered hose, as well as couplings.

Power Shovel—Harnischfeger Corp., Excavator Division, 4400 West National Ave., Milwaukee 14, Wis. Bulletin No. X-104 describes the features and operation of the P&H 1055 Shovel, including P&H's exclusive "Magnetorque" electric swing, the shovel's all-welded construction, the P&H Planetary, simplified hydraulic controls, independent holding brakes and other features.

Arc-Welding Accessories—Metal & Thermit Corp., 120 Broadway, New York 5. Bulletin describes the complete line of welding accessories carried in stock at each of the company's district offices.

Abrasion-Resisting Rubber—B. F. Goodrich Co., Akron, Ohio Catalog section provides detailed information on abrasion-resisting Armorite rubber, including Armorite's construction, general usages recommended, thickness, maximum widths and lengths available on stock sizes.

Magnetic Screen—Stearns Magnetic Mfg. Co., Milwaukee 4. Bulletin No. 120-B describes magnetic screen filter separator for removal of iron or steel particles from liquids and covers open and closed-circuit types with capacity and other specifications.

Building Maintenance — Stonhard Co., 403 North Broad St., Philadelphia 8. Booklet, "Over the Rough Spots," answers more than a hundred problems inherent in the maintenance and construction of industrial buildings and includes information about floors, walls, foundations, roofs, etc., as a guide for building owners and operators in obtaining economical, serviceable maintenance.

Welding and Cutting Equipment—Victor Equipment Co., 844 Folsom St., San Francisco 7. Catalog illustrates in color Victor gas-welding and flame-cutting equipment, with detailed construction and operating features and prices.

Electrical Connector — Industrial Power & Equipment Co., 406 Millbridge St., Pittsburgh 10. Bulletin No. 201 describes and illustrates the R-C-E industrial rubber-clad electrical connector that is said to make a full-load connection permanent in every sense, but can be instantly disconnected and reconnected by a simple screw-motion twist of the wrist.

Magnetic Pulley—Eriez Mfg. Co., Erie, Pa. Bulletin No. 501-A outlines the construction and operation of the

high ratios?

✳ ONE OF 93

DE LAVAL DOUBLE REDUCTION WORM GEARS

De Laval double reduction speed reducers, consisting of combinations of double worm gear reductions, or helical and worm gear reductions, are available with overall ratios up to approximately 8000 to 1. De Laval single reduction worm gear speed reducers are available in ratios up to 90 to 1. If high ratios are your requirement, worm gear speed reducers are the answer—particularly if space is limited and reliability is important. A De Laval representative will help you pick the right size and type.

✳ This double reduction De Laval Worm Gear Speed Reducer is available in many standard ratio combinations, with horizontal or vertical output shafts and is but one of 93 sizes of standard De Laval Worm Gear Speed Reducers.

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WG-14

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Sprague & Henwood Core Drilling Machines are modern in every respect . . . Can EASILY perform the work expected of them! That's because they are built to meet the demand of present day core drilling work! The machines are high speed, exceptionally sturdy, constructed to withstand rugged service. Available with two distinct types of feeds. "Screwfeed" and "Hydraulic," according to the type of swivel head selected. Have many exclusive features. Write today for full details.

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FEATURES

2-motor drive; total 24 h.p.

Series parallel controller.

Extra long journal springs for better trackability, roadability.

Oil-tight, leakproof transmission. Use auto oil, renew once every 6 months.

Adjustable Timken Roller Bearings throughout.

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Makers of Custom-Built Storage Battery Locomotives

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Eriez permanent non-electric magnetic pulley and includes engineering data to aid in selection of proper units, principles of design and operation, specifications, capacities, dimensions and weights.

Earthmovers — Caterpillar Tractor Co., Peoria 8, Ill. Bulletin No. 10361 illustrates Caterpillar equipment and auxiliary units in operation on large and small earthmoving jobs and shows actual projects and their use of tractors, bulldozers, scrapers, motor graders, diesel engine and electric sets.

Wire-Rope and Chain Fittings— Thomas Laughlin Co., Portland 6, Me. Catalog Data Book No. 140 covers the company's complete line of wire-rope and chain fittings and includes specifications, prices and detailed working characteristics of each product.

Stock Gears and Sprockets—American Gear & Mfg. Co., 5900 Ogden Ave., Chicago 50. Catalog No. 340 is a complete listing of the company's line of stock gears and sprockets and includes sizes, specifications and prices.

Gas Welding—Eutectic Welding Alloys Corp., 40 Worth St., New York 13. Current issue of the **Eutectic Welder** describes a new Eutectic development, "Ready - Flux - Coated" EutecRods for gas welding.

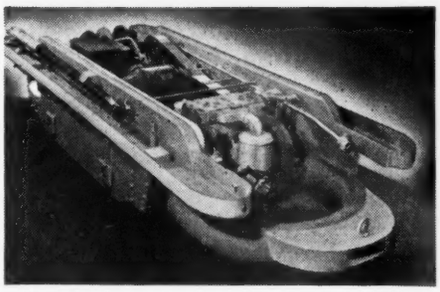
•

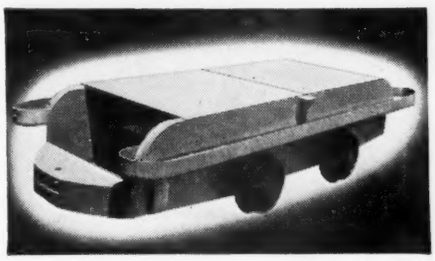
Industrial Notes

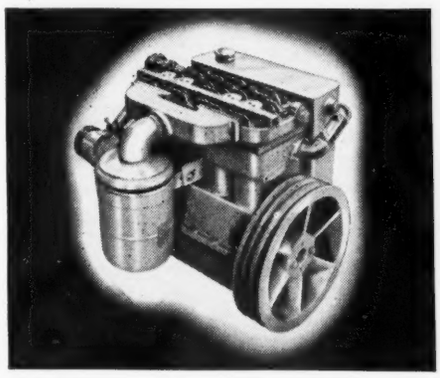
The Ohio Oil Co., Findlay, Ohio, as a part of its 60th anniversary celebration Aug. 1, has issued a 48-page booklet, "Sixty Years of Progress," dealing with the formation of the company on Aug. 1, 1887. The booklet traces the growth of the company since its inception as a local oil-producing enterprise in the Trenton Limestone field in northwestern Ohio to its present position as a nationwide oil company playing an important part in all phases of the petroleum industry—production, transportation, refining and marketing.

Flood City Brass & Electric Co., Johnstown, Pa., has appointed Frank B. Strine sales representative for the territory consisting of western Pennsylvania, northern West Virginia, Ohio, and Maryland.

Beckley Machine & Electric Co., has announced the purchase of the All-State Equipment Co. and the merger of the two companies under the new name of the National Mine Service Co. The new firm will be organized in two divisions, the Bemeco Division, Beckley, W. Va., and the All-State Division, Logan, W. Va. Full warehouse stocks and other facilities will be maintained in both locations, and officers of the company







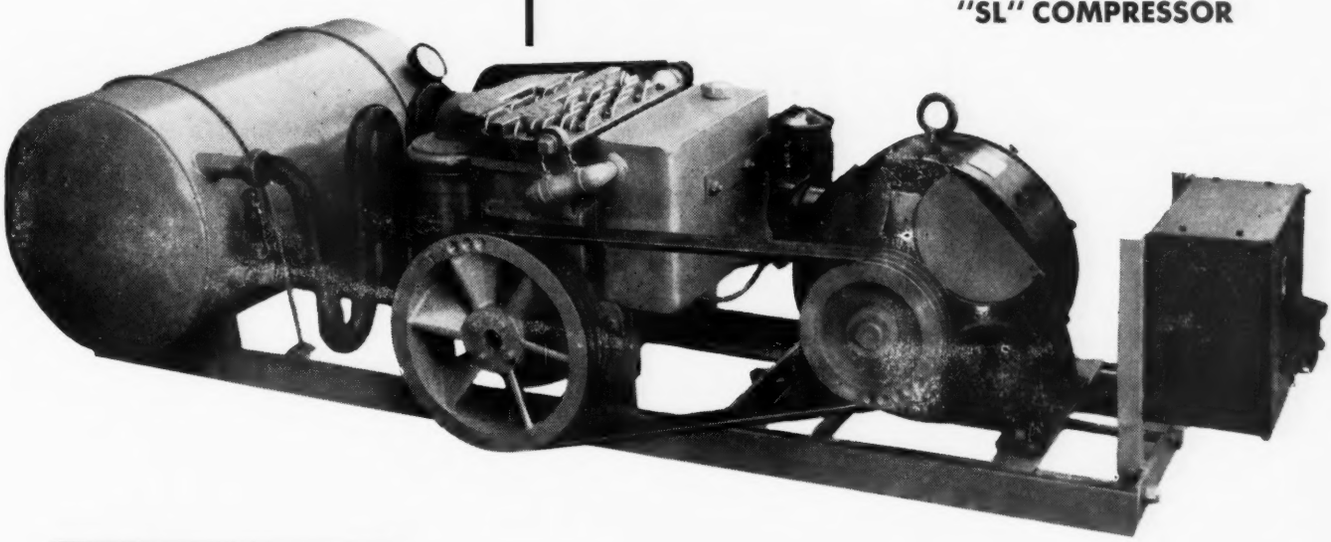
Above, top to bottom: The Cantrell "S-P" Self-Propelled Compressor, the "MC" Mine Car Compressor and the Model "S-101" Compressor Unit.

THE CANTRELL MODEL "SL" IS AN EFFICIENT, ALL-PURPOSE, LOW INVESTMENT AIR COMPRESSOR—

The Cantrell Model "SL" is a complete, but economically priced air compressor that meets every coal mine requirement of stationary or mobile compressor service. When mounted on a permanent base, it is ideal for shops, foundry or tipple. When mounted on suitable trucks, or placed in mine cars it can be transported to any point for sevice in mine. The "SL" is a complete operating unit with controls, motor, compressor and air receiver, ready for service upon delivery, but is available without motor and control box, if desired.

Imperial-Cantrell builds a compressor for every requirement of track, trackless or stationary use. Write today for information on the complete line of Cantrell Compressors.

THE CONTRELL "SL" COMPRESSOR

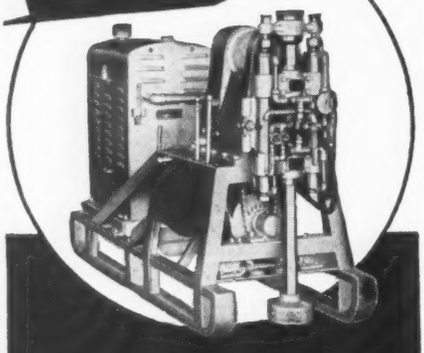


Cantrell COMPRESSORS

IMPERIAL-CANTRELL Mfg. Co.

JELLICO TENNESSEE

Diamond Core Drilling
CONTRACTORS



Testing mineral properties with our light gasoline drills. SATISFACTORY COAL CORES GUARANTEED. Ground solidification by our pre-pressure grouting method for shafts. Wetmine areas, horizontal holes for drainage. Electric drills for inside mine drilling.

MOTT CORE DRILLING CO.
HUNTINGTON • WEST VIRGINIA

PRESSURE CONCRETE
(GUNITE SYSTEM)
by HUDSON RUMSEY CO., INC.

For
Repairs & Construction of
• MINE TUNNELS
• BUILDINGS
• BRIDGES
• RESERVOIRS
• CANALS
• TANKS
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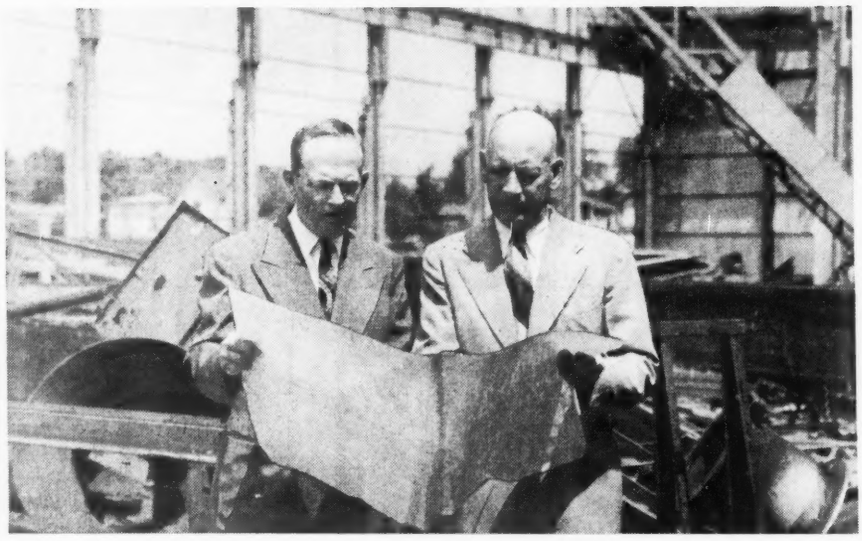
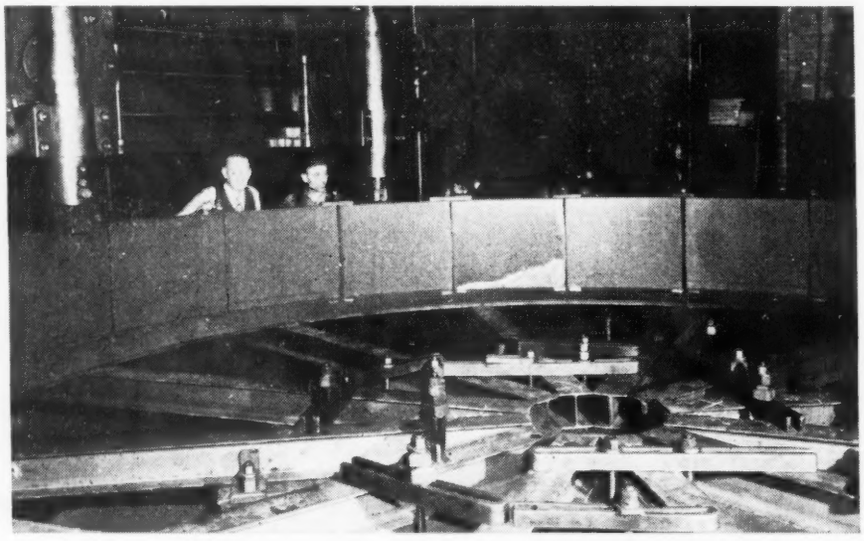


Morrow Plant Expansion Nearing Completion

A. T. COWAN (LEFT), general manager, and H. S. McClain, sales manager, check the floor layout of the new structural and plate shop facilities now nearing completion at the Morrow Mfg. Co., Wellston, Ohio, a subsidiary of the McNally Pittsburg Mfg. Co., Pittsburg, Kan. Structural floor area is being increased by two-thirds to 55,000 square feet and this, combined with new facilities for material handling, will permit one-way movement of all steel from the unloading of raw steel to the shipment of completed work, with a resulting increase in efficiency and speeded service to the firm's customers.



World's Largest Brake Lining Made for Mine Hoists

BRAKE LINING, said to be the largest ever built, is shown in the making at the Passaic, N. J., plant of Raybestos-Manhattan, Inc. The lining is designed to fit brake drums 22 ft. in diameter for use on hoists at European mines destroyed during the war and now being put back into operation. A single piece of brake lining is 30 in. long, 24 in. wide 5 in. thick and weighs 300 lbs.

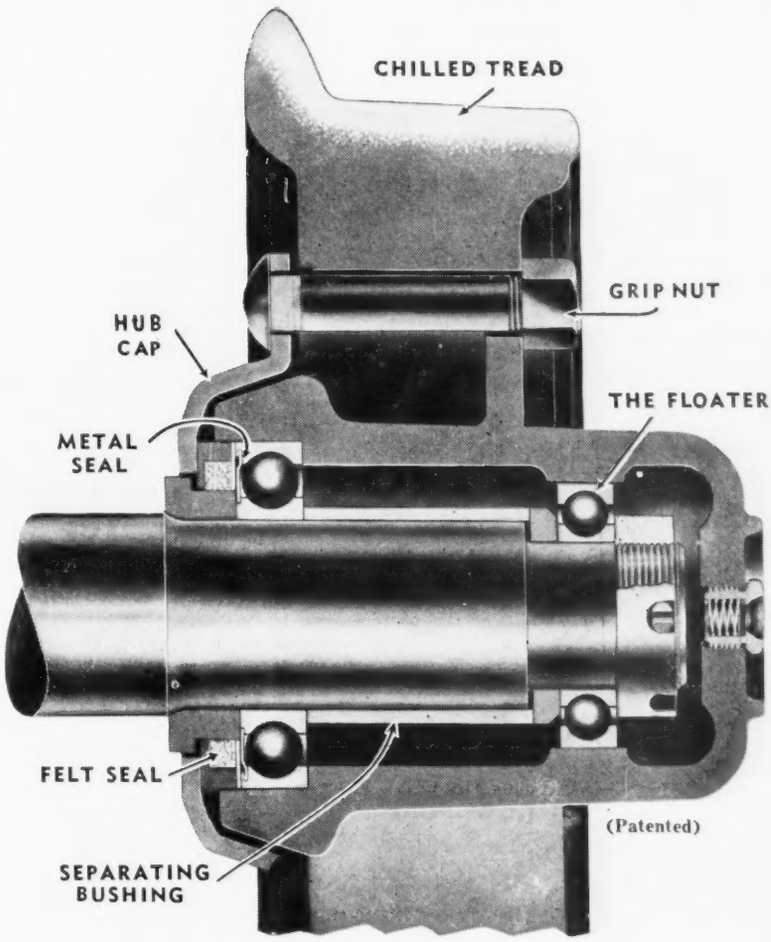
remain: Gordon MacVean, president; R. H. Magee, vice president; and E. J. Nicholls, secretary.

McNally Pittsburg Foundries, Inc., Pittsburg, Kan., has appointed Desmond Gamble, formerly office manager, sales representative in charge of all territory in the western half of the country.

Hercules Powder Co., Wilmington, Del., has appointed Arthur B. Austin assistant manager of its explosives department's Chicago branch. Mr. Austin joined Hercules in 1933 and has been a sales and technical service representative in Hazleton, Pa.; Joplin, Mo.; and Wilmington.

Baker-Raulang Co., Cleveland, Ohio, is increasing its productive capacity to meet the growing demand for its products from heavy industry, it has been announced by E. J. Bartlett, president. An addition to the company's No. 2 factory in Cleveland is already under construction, and

THE WHEEL OF FORTUNES SPINS FOR YOU!



★

Actually, young fortunes are being saved in many, many coal mines where obsolete mine car wheels have been replaced by our "Floater" Ball Bearing Wheels.

In hundreds of mines, wheel service is a forgotten item and old, worn out, obsolete wheels are taking a high, wide and handsome sum of cash for maintenance. Have you checked your wheel expense lately? Have you investigated S-D "Floaters"?

If your locomotives are pulling peak loads now, you can increase their haulage capacity about 50 per cent by simply replacing your present car trucks with S-D "Floater" Ball Bearing Wheels. Records of test that prove this fact are available for the asking. Furthermore, if you have to grease "Floaters" more than once in 5 years, we pay the extra cost—it's a part of our guarantee. Check up on your present wheel greasing costs. This expense probably will amaze you! We also guarantee "Floaters" against breakage or bearing failures for 5 years. "Floaters" mean increased production at great savings, and you can try them on our FREE TRIAL PLAN. Write to us now!

Save POWER *Save* GREASE *Save* MONEY *WITH* "FLOATERS"

20 Car loads of "Automatics" from—

SANFORD-DAY IRON WORKS, Inc. • Knoxville 9, Tenn.

SERVICE
FROM COAST TO COAST

The type of work that is done by a shovel, crane or dragline places it in a class by itself when it comes to taking punishment. Heavy excavating, overloading, improper care all take their toll. We at LIMA go the limit to build equipment that will withstand a normal amount of rough usage but regardless of how well a machine is built, there are times when parts must be replaced. Our interest in a customer does not end with the sale and delivery of a shovel, crane or dragline. We are ever ready to serve you at a moments notice as long as the machine is in service. A complete record of each machine we build is preserved so that when a part is ordered the customer can be sure that it will fit accurately. Parts are shipped the same day the order is received whenever possible. Special attention will be given to your request for parts service from headquarters located in the cities shown on the above map.

LIMA LOCOMOTIVE WORKS, INCORPORATED

Shovel and Crane Division · Lima, Ohio, U. S. A.

THE LIMA DIAMOND

FOR OVER 75 YEARS AN EMBLEM OF QUALITY WORKMANSHIP

LIMA

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Capacities . . . SHOVELS ¾ YARD TO 5½ YARDS • CRANES 13 TONS TO 100 TONS • DRAGLINES VARIABLE

additional facilities for heavy machine operations now proposed will increase productive capacity for materials—handling equipment approximately 50 percent over that operated during 1946.

American Car & Foundry Co., has appointed Lloyd H. Mulbarger sales engineer in its New York sales office.

Link-Belt Co., Chicago, has announced several personnel changes. Ralph W. Rausch, assistant chief engineer at the Pershing Road plant in charge of estimate-engineering since 1933, has been appointed chief engineer, succeeding C. S. Huntington, who has retired because of ill health. H. Walter Regensburger, assistant to the vice president in charge of engineering since 1944, has been appointed divisional engineer in charge of estimate-engineering at the Pershing Road plant. Eugene P. Berg, assistant to the president since the recent death of E. L. Berry, has been appointed general superintendent at the Pershing Road plant. Joseph C. Spence, formerly general superintendent at the Pershing Road plant, has been appointed assistant to Harold L. Hoefman, who recently became vice president in charge of manufacturing.

Stewart-Warner Corp., Chicago, has appointed Gustave Treffeisen sales manager of its Alemite distribution division, succeeding Charles I. Kraus, who will become Alemite distributor at Minneapolis, Minn. Mr. Treffeisen, who has been associated with Stewart-Warner for 26 years, has been assistant to Mr. Kraus for the last year and a half.

Ford Motor Co., Dearborn, Mich., has transferred T. J. O'Neil, sales district manager at Indianapolis, to managership of the Memphis, Tenn., district. A native of Memphis, Mr. O'Neil has been associated with Ford for 31 years and had previously served as manager of that district from October, 1943 to September, 1945.

Cummins Engine Co., Inc., Columbus, Ind., has announced four new personnel assignments. S. J. Coffey, former manager of Cummins Diesel Sales Corp. of Ill., has been appointed manager of regions, to work directly under the general sales manager in supervising the activities of the Cummins regional offices. Byron A. Duling has been named manager of engine distribution, with headquarters at Columbus, and will have charge of all engine distribution to Cummins dealers and to manufacturers who use Cummins Diesels. Raymond Boll has been appointed assistant manager of the Cleveland region and W. C. Phillips has been named assistant manager of the southeastern region.

Air Reduction Sales Co., New York, has opened a new acetylene plant in Dayton, Ohio, according to L. O. Geiger, Airco's Dayton district man-

Lee-Norse GREASING TRUCK

The Modern Mobile Greasing Station

• This modern greasing station on wheels carries Hydraulic oil—Transmission—and Chassis lubricants to the mining machinery at the face. . . . It is fully equipped with air operated grease pump and pressure gun and separate motor driven air compressor. . . . It enables you to apply correct lubricants—easily —quickly—and to keep your mechanical equipment in better shape thus eliminating costly breakdowns and repairs.

We also specialize in complete factory rebuilding and overhauling of Loaders — Cutters — Shuttle Cars and other Mining Machines.

PHONE CHARLEROI 750

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Dustproof your coal with WYANDOTTE CALCIUM CHLORIDE

• Coal treated with Wyandotte Calcium Chloride makes a hit with both dealers and householders. They like its freedom from dirt and dust . . . the ease of handling it. And they'll bear you in mind when it comes to further purchases.

Dustproofing coal with Wyandotte Calcium Chloride is safe, economical, easy. A little does a lot to produce that special sheen that means sales appeal. When you dustproof coal you automatically freezeproof too!

More information about this process is yours for the asking. Just mail the coupon for full information and literature about Wyandotte Calcium Chloride.

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Wyandotte, Michigan
Send me literature and further information about the uses and advantages of Wyandotte Calcium Chloride.

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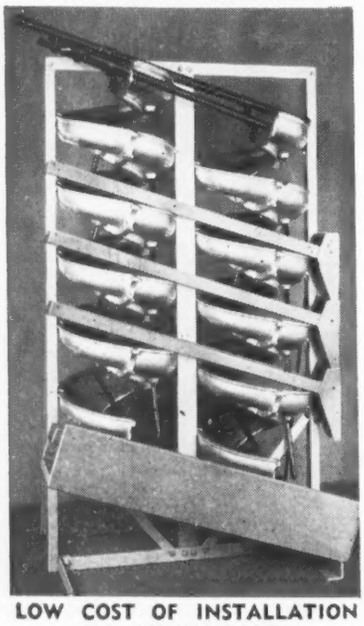
HUMPHREYS
SPIRAL CONCENTRATOR
FOR CLEANING FINE COAL



LOW COST OF INSTALLATION
NO MOVING PARTS
LOW OPERATING COST

Engineering Division
The Humphreys Investment Co.
First National Bank Building
DENVER 2, COLORADO

ager. Superintendent of the plant will be R. K. Haygood, who has been with Air Reduction for more than ten years.

Allis-Chalmers Mfg. Co., Milwaukee, has named Fred C. Bond technical director of its basic industries department and Will Mitchell Jr. director of the department's research laboratory. Bruce H. Irwin has been appointed assistant laboratory director and director of training for department. Mr. Bond joined Allis-Chalmers in 1930 and was formerly director of the basic industries laboratory.

Twin Disc Clutch Co., Racine, Wis., has appointed C. F. Mohrbacher assistant sales manager of the Racine division. A. E. Young has been named district manager of the West Coast territory, and E. H. Bennett district manager, Eastern territory.

Electrical Equipment Co., Rochester, N. Y., has announced establishment of a New York sales office at 224 E. 38th St.

Western Machinery Co., San Francisco, has announced the moving of its eastern office facilities from 50 Church St. to new and enlarged offices located at 30 Church St., New York City. The new location will serve as eastern headquarters for both the Western Machinery Co. and its division, the Western-Knapp Engineering Co. Herman J. Daniels is eastern manager in charge of operations for the Western Machinery Co., and manager of the Western-Knapp Co. is H. F. Lynn.

Quaker Rubber Corp., Philadelphia, has appointed A. Harold Smith New York district sales manager, and P. H. Potts New York branch manager, with headquarters in New York City. Mr. Smith has been manager of the belting division and assistant sales manager in territory contacts. Mr. Potts resumes his office after his temporary wartime activities in special sales work for the company.

The Mining Safety Device Co., Bowerstown, Ohio, has changed its name to **The Nolan Co.**, consistent with the company's major brand name of "Nolan," under which many of its products have been marketed for many years. Another factor in the change, according to G. W. Merritt, general manager of sales, was the recent acquisition of the Edelblute Mfg. Co., whose products, except in very specialized cases, also will be sold under the "Nolan" name.

Cardox Corp. has added R. E. Martin to its staff as a mining engineer in the Pittsburgh district, with headquarters at Library, Pa. G. M. Patterson has been appointed assistant district manager for Indiana and Western Kentucky, with headquarters at Evansville, Ind. For the past two years Mr. Patterson has been a min-

Leading coal producers
prefer
MESCOWELD
RAIL BONDS
because

1. Mescoweld Rail Bonds are easily installed.
2. Mescoweld Rail Bonds assure maximum conductivity.
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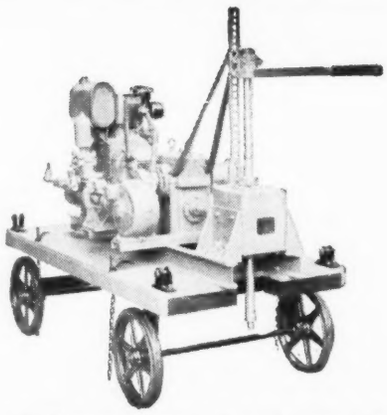
Mosebach manufactures a complete line of rail bonds and other track and trolley products for the mining industry. Write for catalog containing full information.

Type M8-F all-purpose bond

Mosebach Electric & Supply Co.
1115 Arlington Avenue Pittsburgh 3, Pa.
HEmlock 8332

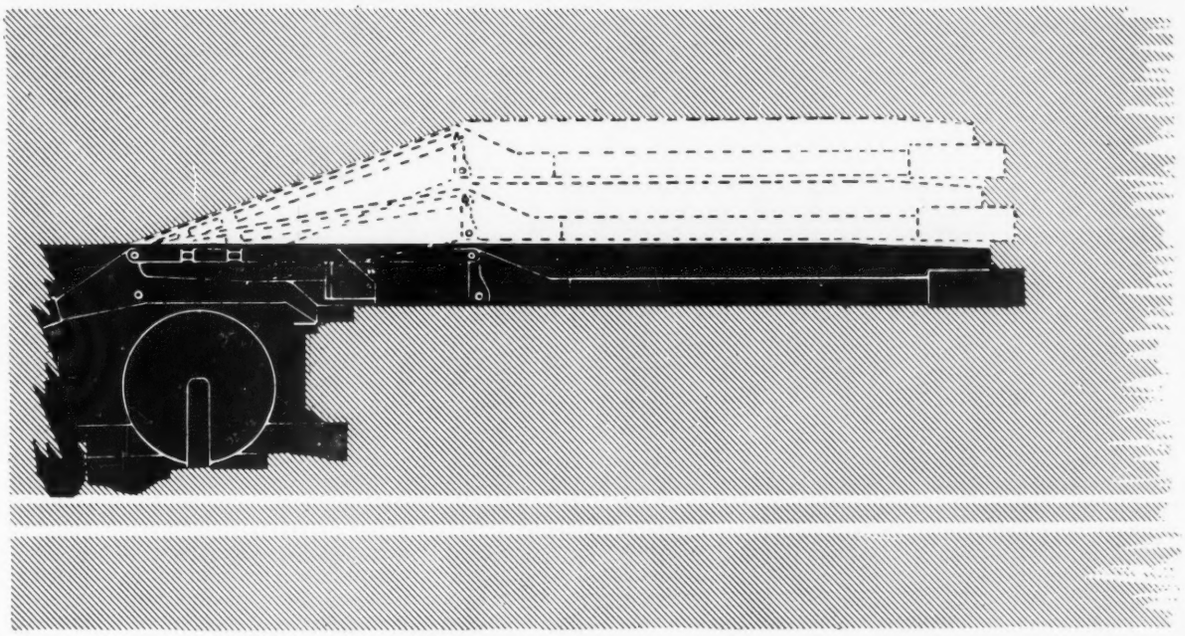
CORE
DRILLS



- Accurate cores of coal seams by using single or double tube core barrels.
- Ideal for determining overburden before strip mining.
- Diamond—alloy or steel shot bits.
- Light weight — easy to move in rough country.

SEND FOR BULLETINS

ACKER DRILL CO.
SCRANTON 3, PA.

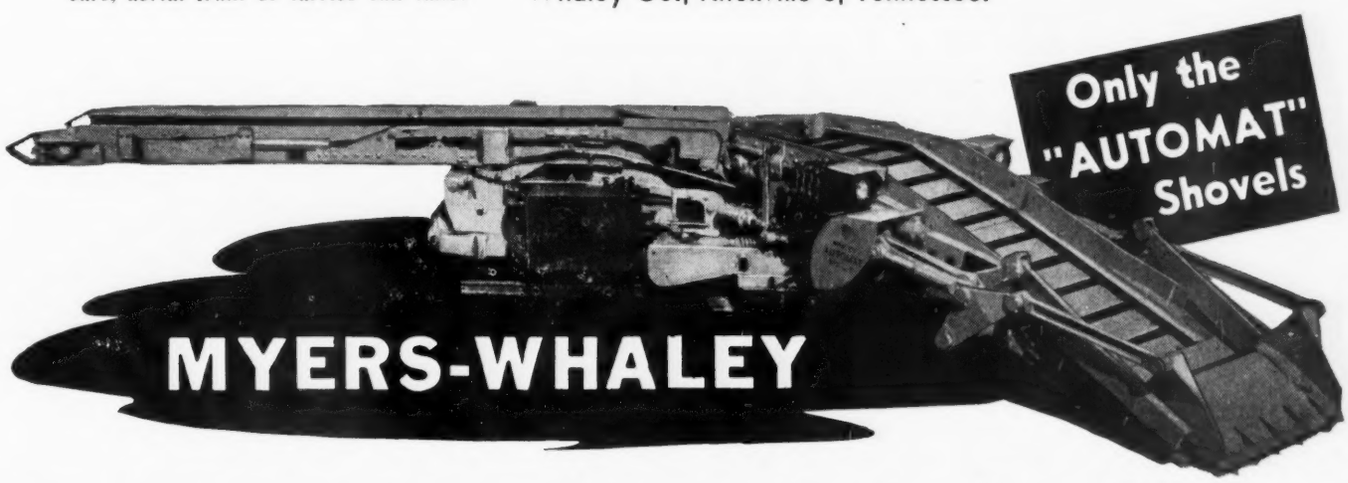


IN LIMITED HEAD ROOM THE "AUTOMAT" LOADS MAXIMUM CAPACITY CARS AND LOADS THEM HEAVIER

The Whaley "Automat" comes to you with the exclusive Parallel Lift Rear Conveyor. The Conveyor that, regardless of the height of car, is always parallel to the track and top of car for its full length extending over the car. Height of conveyor is hydraulically controlled, and the parallel feature is automatic. This means that the "Automat" can load a maximum size car in limited head room and load it to capacity.

Before you buy a loader, be sure to investigate the "Automat". You'll find several exclusive features that may be of real advantage to you, plus its ability to deliver safe, dependable loading service under any conditions. Myers-Whaley Co., Knoxville 6, Tennessee.

"The 'Automat' will load, in its stride, any lump of coal that will pass through your tipple, or any lump of rock your cars, aerial tram or larries can take."



Mechanical Loaders Exclusively for Over 39 Years

ing engineer for Robinson & Robinson and for 5½ years previously was chief mine inspector for Kentucky.

Baker-Raulang Co., Cleveland, has named J. G. Green, formerly assistant general manager in charge of sales for the Philco Storage Battery Division, Trenton, N. J., mid-western representative for its Baker Industrial Truck Division, with headquarters in Chicago. Mr. Green had previously been associated with Westinghouse Electric Corp. and the Louis Allis Co. and also had his own company in Pittsburgh for some time.

Goodyear Tire & Rubber Co., Mechanical Goods Division, has made R. E. Pauley, district manager at Pittsburgh, sales manager for the company's molded-goods plant at St. Mary's, Ohio. He is succeeded by Robert B. Warren, formerly eastern railroad sales manager in New York.

Boston Woven Hose & Rubber Co., Boston, Mass., has been appointed the Bluefield Supply Co. exclusive distributor for its complete line of conveyor belting, hose and other industrial rubber products in the territory served by Bluefield Supply in West Virginia, Virginia, Kentucky, Tennessee, and North Carolina. The company also plans to have a sales engineer stationed in Bluefield to assist in the solution of special problems.

Heyl & Patterson, Pittsburgh, has named A. G. Gilbert and Thomas L. Welsh to its coal-preparation sales department. Before joining Heyl & Patterson, Mr. Gilbert was a sales engineer with the Harris Pump & Supply Co., Pittsburgh, and Mr. Welsh was in the engineering service of the government at Wright Field.

Highway Equipment Co., Pittsburgh, has named A. L. Schoenberg manager of its newly created coal-mining division. Mr. Schoenberg, who has been associated with the Sullivan Machinery Co. for many years, was previously manager of Sullivan's district office in Pittsburgh.

The Edison Storage Battery Division, Thomas A. Edison, Inc., West Orange, N. J., has announced a plant-expansion program involving an expenditure of $2,000,000. In making the announcement, George E. Stringfellow, general manager of the division, explained that the division's business since the war has been at an average volume 50 percent greater than during the three years immediately prior to our entry into the war. In addition to the program, which will embrace new equipment to be installed in plant buildings employed during the war by other divisions of the company, the establishment of a plant in Great Britain for manufacture of the Edison miners safety electric cap lamp was initiated earlier this year.

Chain Belt Co., Milwaukee, has appointed Charles Stanton district field engineer in its Philadelphia office. He was formerly in the Detroit office.

Hewitt-Robins, Inc., Buffalo, has appointed I. H. "Mike" Welch a sales representative for its central Iowa territory, with headquarters in Des Moines.

American Car & Foundry Co., New York, has announced several promotions. In its mine-car sales division, Earl C. Riegel has been named sales agent, succeeding R. A. Lockard, recently retired, and Karl R. Dietterick has been made sales agent for the anthracite territory, succeeding A. E. Smith, retired. They both will have headquarters at the ACF Berwick, Pa., plant. L. B. Chapman, formerly connected with the company's marine division, has been appointed assistant manager, valve division, in the New York office. H. P. Ackerman, formerly assistant manager of sales promotion in the Eastern states, has been named general sales representative of the valve division.

Gordon Lubricating Co., Pittsburgh, has added O. C. Burger, formerly with the Pure Oil Co., to its staff as a lubrication engineer.

Electric Steel Foundry, Portland, Ore., has established an eastern manufacturing plant at Danville, Ill., for production of its line of Esco dragline buckets and dippers. Vincent J. Shanahan is superintendent of the new plant, which is expected to materially improve delivery time to eastern users of the company's products.

Ford Motor Co. has promoted O. Fred Yando to assistant region manager of its central region. Mr. Yando has been manager of the central region business management department.

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MECHANICAL FEED HORIZONTAL DRILL.

Ten years of field test has proven that our power-feed design of direct, transmission and worm gearing with two-speed control will not only cut shot hole drilling time in half but also eliminates costly maintenance delays. V-belt drive to the power-feed with an additional ample clutch in that assembly gives absolute control of a drilling speed of two to three feet per minute with a retrieving speed of twenty-four feet per minute.

The Parmanco Horizontal is adapted to all forms of highwall drilling, will handle a six-inch auger up to a distance of sixty feet or more and, by use of our patented augers with interrupted flights and secondary cutters, will drill an absolutely clean hole with a minimum of torque. It permits the drilling of a controlled-angle hole which makes possible a great saving of explosives through the cantilever effect of this controlled-angle drilled hole.

EFFICIENT STRIPPING STARTS WITH EFFICIENT DRILLING

PARIS MANUFACTURING COMPANY
PARIS, ILLINOIS

"TOPS" FOR ALL

Heavy Duty Mining Jobs

Simplex Hydraulic JACKS

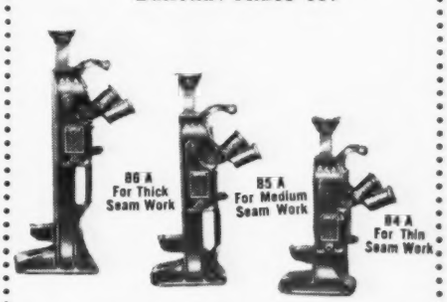
FOR SAFETY'S SAKE . . . PUT SIMPLEX In The Picture!

● These rugged, heavy duty hydraulic jacks combine ease of lift, lightness and safety. Each unit is factory-tested to 50% over rated capacity. Built in 3, 5, 8, 12, 20, 30, 50 and 100 ton capacity models.

Features that make Simplex Hydraulic Jacks top choice for mining operations include (1) Minimum closed height and maximum lift, (2) Pressure tested malleable iron top nut and base (30, 50 and 100 ton models have solid bases, double lever sockets, and high and low speed pumps), (3) Neoprene pressure packing, (4) Drop forged steel caps that cannot come loose, (5) Efficient operation in either horizontal or vertical positions.

SIMPLEX GENERAL PURPOSE MINE JACKS

There is a Simplex Safety Speed Ratchet Lowering Jack—5 to 35 tons capacity—for every mine job—coal cutting and loading machines, rerailing mine cars, shop and track work, etc. Outstanding features include double lever sockets; rugged cadmium plated springs and links; long, wide, concave rack bar toe lifts. Write for new Bulletin: Mines 47.



Specify a Simplex Heavy Duty Hydraulic Jack—most models are immediately available. Their faster, easier lift will save time on every application.

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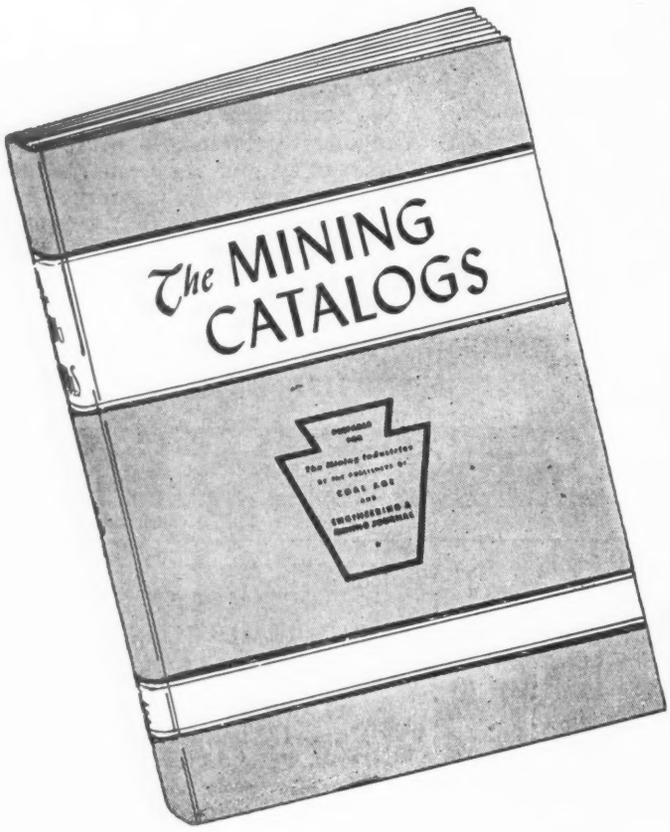
the 31 second "look-up" on catalog data in the MINING CATALOGS



1. Turn to the directory section to find all the known manufacturers of whatever kind of equipment, materials or supplies you need.

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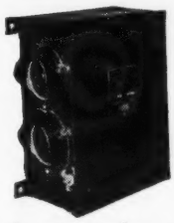

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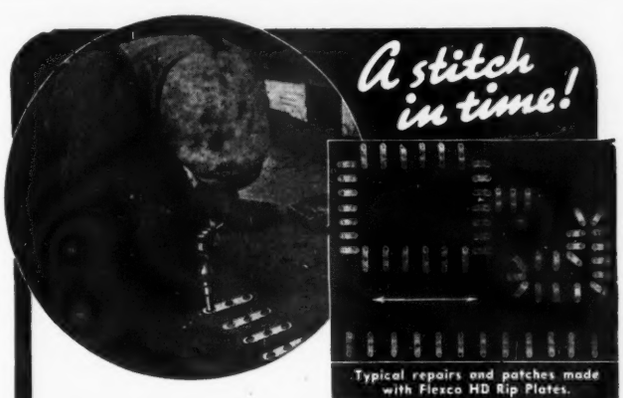

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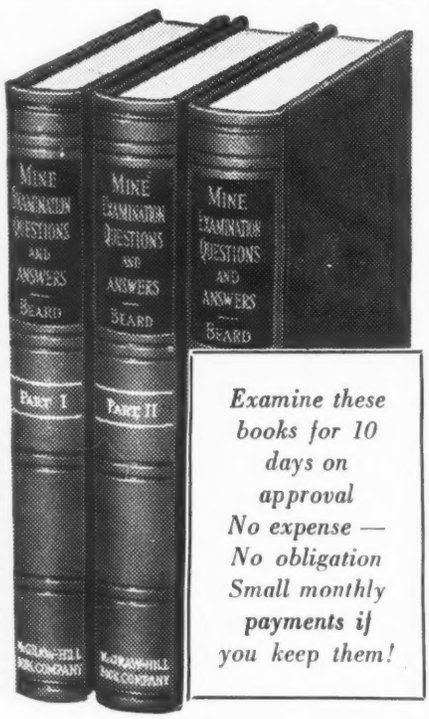

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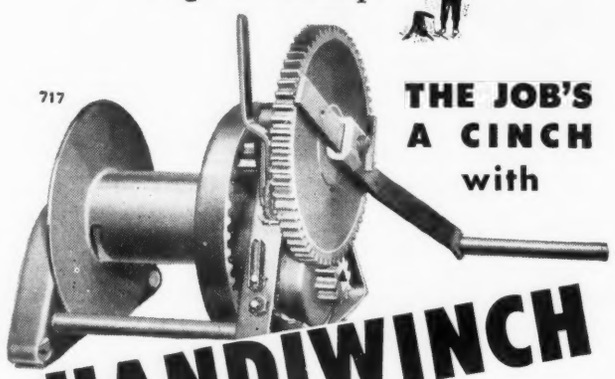

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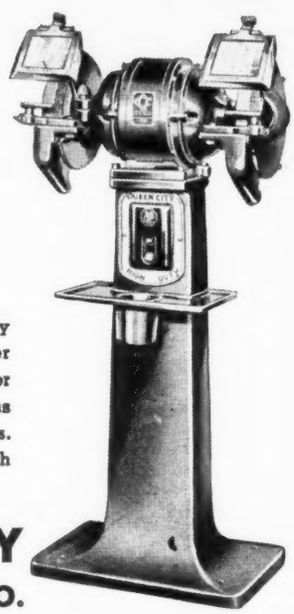

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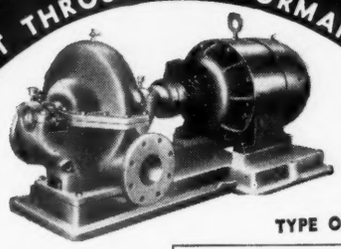

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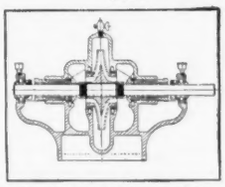

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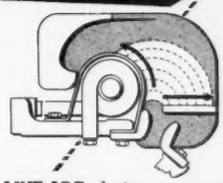

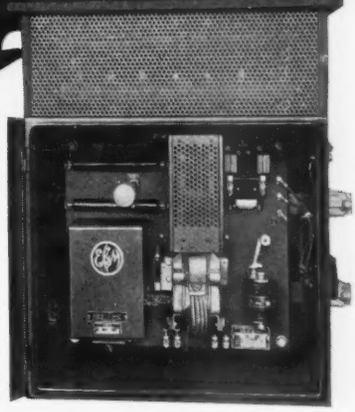

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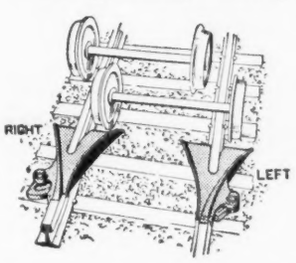

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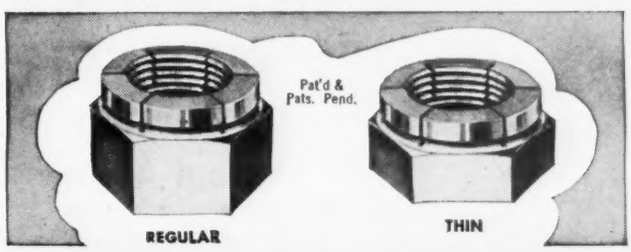

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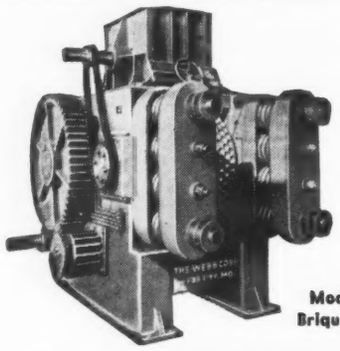

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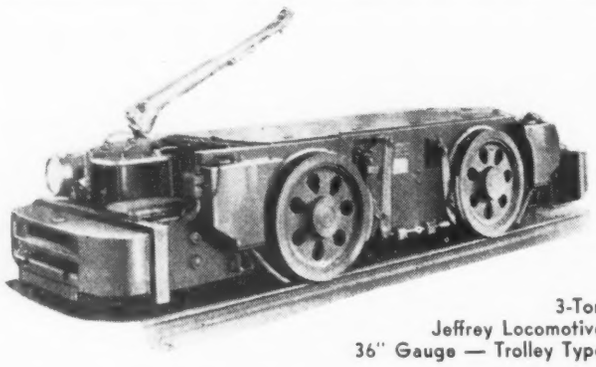

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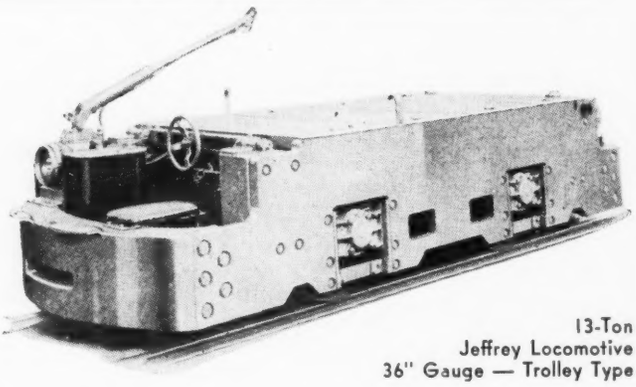

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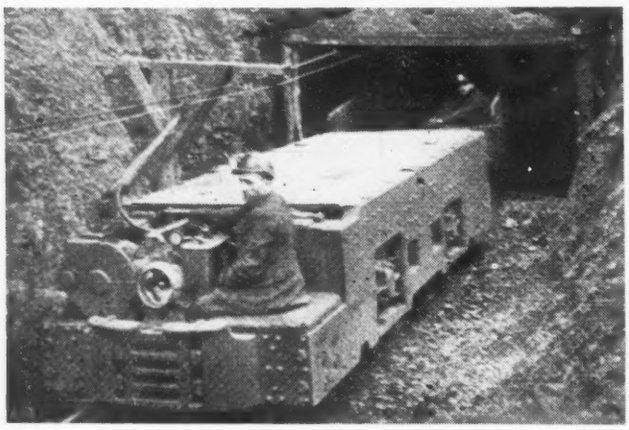

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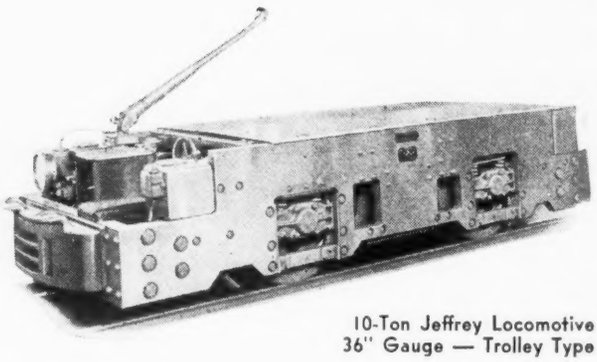
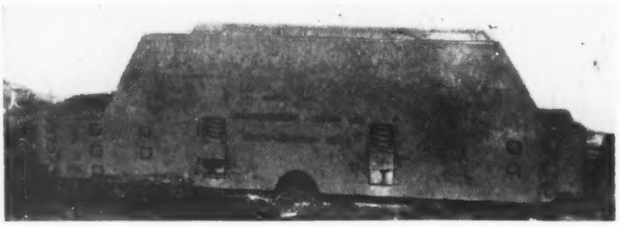
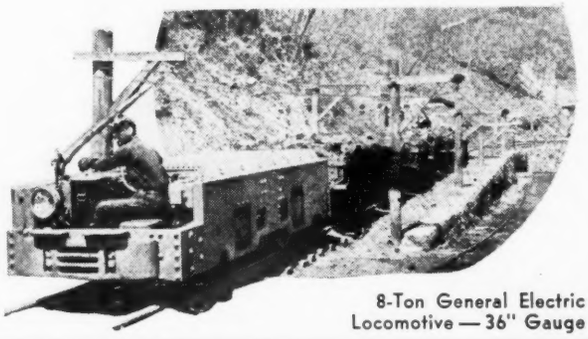


10-Ton Jeffrey Locomotive
36" Gauge — Trolley Type



20-Ton Goodman Locomotive High Type — 36" Gauge



8-Ton General Electric
Locomotive — 36" Gauge

THE COLUMBINE MINE EQUIPMENT CO., INC.

FLAT IRON BUILDING, 1669 BROADWAY **DENVER 2, COLORADO**

Subsidiary of Portland Equipment Co., 11 Broadway, New York 4, N. Y.

WRITE FOR OUR COMPLETE LIST OF MACHINERY AND EQUIPMENT

SEE PAGE 185 FOR APPROXIMATE SUMMARY OF HARD-TO-GET OFFERINGS

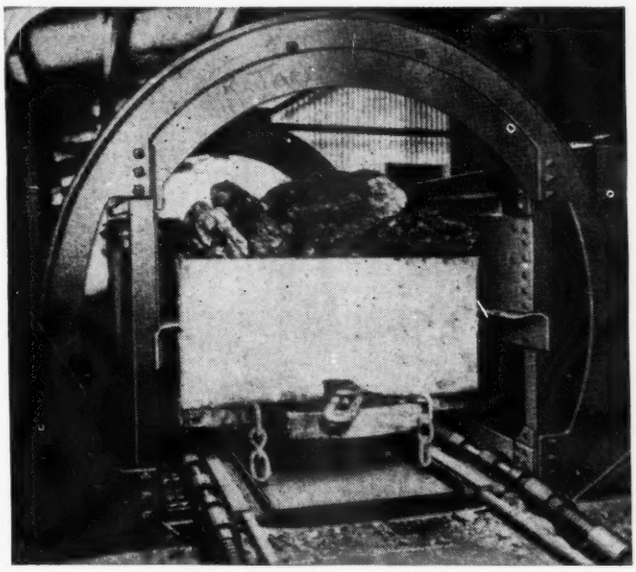
THE COLUMBINE MINE EQUIPMENT CO., INC.

1669 BROADWAY, DENVER 2, COLORADO

... Three and one-half million dollars in new and nearly new coal mining machinery and equipment

Subsidiary of Portland Equipment Co., 11 Broadway, New York 4, N. Y.

Complete Liquidation . . . Immediate Delivery

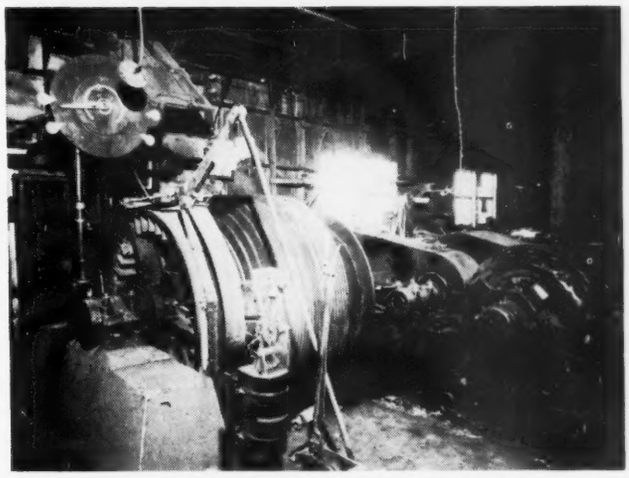


ROTARY CAR DUMPER
Fast Dumping of Coal Cars

HERE ARE SOME OF THE HARD-TO-GET OFFERINGS

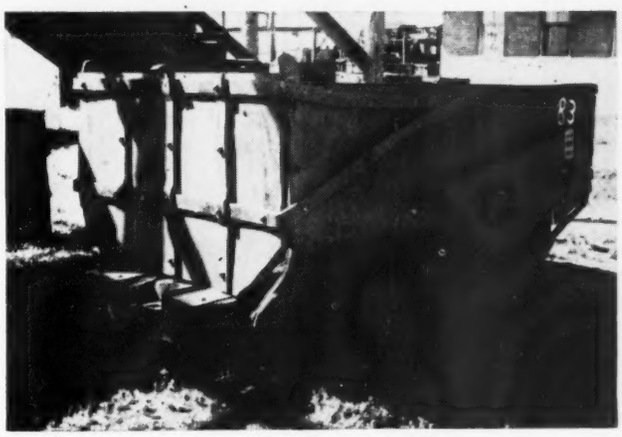
HAULAGE MOTORS, trolley type locomotive—250 Volt D. C.—electrically driven, 36" gauge, General Electric, Westinghouse, Jeffrey and Goodman.
COAL MINING MACHINES—29 L-E "Arcwall" Jeffrey mining machines mounted on Joy electrically driven caterpillar trucks.
Goodman Shortwall No. 112 mining machines.
Goodman 36" Gauge TRUCKS, Type "M."
MINING MACHINE TRUCKS—Joy "T-1."
MOTOR GENERATOR SETS—2 sets 225 H.P. connected to Ridgeway 150 K.W. generators, with panelboards, A.C. and D.C. meters and transformers complete. 2 sets 300 H.P. connected to Ridgeway generators, 200 K.W., complete with panelboards, A.C. and D.C. meters and transformers. And others.
BATTERY CHARGING UNITS—Joy, Westinghouse, Hobart Bros. Co., Electric Products Co.
MOTORS—A.C. and D.C., all types, 1 H.P. to 300 H.P., starting compensators and switches.
TRANSFORMERS—General Electric, Westinghouse, 7½ KVA, 37½ KVA and 150 KVA.
BOX CAR LOADERS—Ottumwa—Manerre.
PUMPS—Geared and centrifugal—motor and belt driven—Gould, Demming, and Myers.
FANS—Jeffrey, American Blower, Sturdevant.
TIPPLE—3 track tipple consisting picking screens, grizzlies, car retarders, end dump, belt conveyors, elevator bucket conveyors, box car loaders complete.
VIBRATOR SCREENS—Ty-rock 2, a surface F-600 5' x 10' screen, full floating.
SHAKER SCREENS—"Marcus" shaker screens.
CONVEYORS—Flight conveyors, elevator conveyors.
COAL CRUSHERS.
RAILS—250 tons 30 lb., 200 tons 40 lb., 150 tons 50 lb., 150 tons 60 lb., 350 tons 65 lb., 200 tons 75 lb.
SPIKES, bolts, tie plates, frogs, switches, switch throws.
COPPER trolley wire—2/0, figure 8 and 4.0 round.
TROLLEY HARDWARE—Hangers, clamps, frogs, switches, roof hangers.
TRANSMISSION WIRE—Single conductor, 2 conductor, 3 conductor—Neoprene, glass, rubber insulated 2/0 to 500,000 CM.
JOY 7-BU. LOADERS— D Caterpillar mounted with high pedestal.
SHUTTLE CARS—Joy 42" storage battery.
ELEVATOR CONVEYORS—Joy.
AIR COMPRESSORS.
MACHINE SHOP—Complete.
ELECTRIC SHOP—Complete.
CARDOX PLANT—Complete.
BATTERIES—Exide and Gould Ironclad, 24 cells.
$150,000.00 WORTH of new parts, bearings, gears, bolts, nuts and screws for Joy, Jeffrey, Goodman, Ottumwa, Manerre, General Electric, Westinghouse, Demming, and other popular manufacturers' equipment.

ALSO THOUSANDS OF ITEMS TOO NUMEROUS TO MENTION.



Cornical Drum Hoist, 300 HP, Drum 8'-6" Dia. x 72" wide

Phillip's Crossover Dump and Car Retarder



Tipple Car, 2 Ton, 36" Gauge

WRITE FOR OUR COMPLETE LIST OF MACHINERY AND EQUIPMENT

LOCOMOTIVES—250 VOLT DC

6—15-ton Jeffrey, type MH-110.
3—13-ton Goodman, type 136B.
2—13-ton Westinghouse, type 908-C.
4—10-ton Jeffrey, type MH-78.
5—10-ton General Electric, type HM-830.
3—8-ton Westinghouse, type 906-B.
3—8-ton Jeffrey, type MH-100.
6—8-ton General Electric, type MH-839.
5—8-ton Goodman, type 32-I-4-T-2.
6—6-ton General Electric, type HM-801.
The 6 and 8-ton Locomotives are equipped with CY-21 motor driven gathering reels and cable, track gauge 36" to 44".

MINE CARS

600—3½-ton End Dump Steel Mine Cars, overall length 10'2", Timken roller bearing wheels 18", height overall 46", axles 3", steel bodies 3/16", 8" oak bottoms, track gauge 42". Excellent condition—Bargain for quick sale—$75.00 each.

CUTTING MACHINES—250 VOLT DC

20—12-AA Goodman, 50 H.P.
12—112-AA Goodman Universal, 50 H.P.
5—112-CA Goodman Universal, 50 H.P.
8—7-B Sullivan, 50 H.P.
10—24-L Jeffrey, permissible type Longwall Machines.
12—Joy T1 Caterpillar type trucks.
The above machines are equipped with tip-turn trucks, cable reel and cable.

LOADING MACHINES—250 VOLT DC

5—L-400 Jeffrey.
2—260 Goodman.
8—7-BU Joy.
3—Myers-Whaley.

LOADING AND CUTTING MACHINES—220/440 VOLT AC

8—7-BU Joy. Just taken out of service.
8—112-G3 Goodman Universal, tip-turn trucks, cable reel and cable.

ELECTRIC HOISTS

1—Nordberg Shaft Hoist with 1600 H.P. General Electric Motor and all necessary appurtenances.
1—1300 H.P. Nordberg Shaft Hoist with all necessary appurtenances.
Several other hoists from 200 to 1000 H.P., suitable for shaft, slope or drift mine.

MOTOR GENERATOR SETS

2—300 KW Allis-Chalmers, 250/275 volt DC, 2300/4000 volt AC, 3 phase, 60 cycle.
2—209 KW Ridgway, 250/275 volt DC, 3 phase, 60 cycle, 2300 volt AC.
The above sets are complete with switchboards, switchgear and automatic reclosing circuit breakers for the DC end.

STEEL TIPPLES & MISCELLANEOUS

We have several 3, 4 and 5 track steel tipples, complete with shaker screens, vibrating screens and all necessary appurtenances, suitable for shaft, slope, drift or strip mines.
1—Jeffrey 10' Aerovane single stage blowing fan.
1—Belt Conveyor, 7-ply, 32 oz., 42" Goodyear belt, steel carrying frame, Timken bearing carrying and return idlers, complete with 75 H.P. motor, 450' centers.

WE SPECIALIZE IN BUYING COMPLETE MINES THAT ARE GOING OUT OF BUSINESS OR FROM RECEIVERS IN BANKRUPTCY, ADMINISTRATORS OF ESTATES, ETC.

COAL MINE EQUIPMENT SALES COMPANY

306-7 BEASLEY BUILDING — L. D. PHONE—34 — TERRE HAUTE, INDIANA

COAL CUTTING MACHINES

1—35B Jeffrey Shortwall, 250 V., D.C.
1—35BB Jeffrey Shortwall, A.C.
2—29C Jeffrey Arcwall, 250 V., D.C.
1—124 E. J. Goodman Slabbing, 250 V., D.C.
1—36B Jeffrey Longwall, 250 V., D.C.
1—12G3 Goodman Shortwall, A.C.
2—112 C.A. Goodman, 250 V.

LOCOMOTIVES

1—5-ton Goodman with 2 type 41, 250 V. motors.
1—5½-ton Ironton Storage Battery Locomotive.
1—6-ton Jeffrey with MH 88, 250 V. motors.
2—15-ton G.E., 250 V.

M. G. SETS

1—60 KW, 250 V., D.C., with 100 HP Synchronous Motor.
1—75 KW, 250 V., D.C., with 112 HP Synchronous Motor.
1—150 KW Ridgeway, 275 V., D.C., 3/60/2200/1200.

ELECTRIC MOTORS

1—400 HP Allis-Chalmers SC 3/60/2200/1150.
1—250 HP G.E. Slipring, 3/60/2200/600 RPM.
1—200 HP Westinghouse, type CW, slipring, 3/60/2200/514 RPM.
1—185 HP Burke SC 3/60/2200/1150.
1—150 HP G.E. Squirrel Cage 3/60/900.
1—125 HP G.E. Squirrel Cage 3/60/900.
1—100 HP Synchronous Motor 3/60/440/1200 RPM.
1—100 HP G.E. Squirrel Cage 3/60/900 RPM.
1—40 HP Westinghouse Squirrel Cage 3/60/1800.
1—25 HP G.E. Squirrel Cage 3/60/720.
2—15 HP Westinghouse Squirrel Cage 3/60/960.
1—7½ HP G.E. Squirrel Cage 3/60/1800.
1—5 HP Westinghouse Squirrel Cage 3/60/1800.

TRANSFORMERS

3—333 KVA Westinghouse, 22000 V. to 230 V.
1—50 KVA Westinghouse 1/60/2300/220/440 V.
2—15 KVA 1/60/2300/220/440.

COAL CRUSHERS

1—36" x 36" Jeffrey S. R. Coal Crusher, gear drive.

TIPPINS MACHINERY CO.

PITTSBURGH 6, PA.

SYNCHRONOUS ROTARY CONVERTERS

Qu.	KW	Make	Speed	D.C.V.
1	750	G.E.	1200	600
1	500	Whse.	1200	600
1	400	G.E.	1200	275
1	300	Whse.	1200	275
1	300	Whse.	1200	600
1	300	G.E.	1200	600
1	175	Whse.	1200	275
1	175	G.E.	1200	275
1	125	G.E.	1200	275

MOTOR GENERATOR SETS

3—150 KW, 900 RPM, 250 V. DC to 225 HP, 2300 V. AC Syn.
2—150 KW, 900 RPM, 600 V. DC to 225 HP, 2300 V. AC, Syn.

MOTORS

1—80 HP, 1200 RPM, Cr. Wh. 220/440/3/60 Ind.
1—75 HP, 1800 RPM, U. S. Line Start 220/440/3/60 Ind. B.B.
1—65 HP, 1200 RPM, G. E. type KT, 220/440/3/60 Ind.
1—40 HP, 900 RPM, Whse. type CW, 440/3/60 Slip Ring.
5—5 HP, 2200 RPM, Reliance Ex. Proof, 230 V. D.C.
Several Whse. type SK, 230 V. D.C.
5, 7½, 10 and 15 HP, New TEFC and standard open ball bearing AC motors available. Across line and reduced voltage starters.

Electrical Equipment

C. B. LOCKE CO.
P. O. BOX 3227
TEL. 38-136
CHARLESTON, W. VA.

NEW and REBUILT

Converters, Motor Generator Sets, A. C. & D. C. Motors, Control Equipment and Transformers.

We build equipment to fit your requirements. Over 25 years engineering background.

TRANSFORMERS

1—200 KVA Kuhlman, Cont. Duty, Auto. 3800-2300/3/60.
3—37½ KVA Pitts. Cont. Duty, Auto. 6900-2300/1/60.

RAILS NEW AND RELAYING

TRACK ACCESSORIES
from 5 *Warehouses*

- PROMPT SHIPMENTS
- FABRICATING FACILITIES
- TRACKAGE SPECIALISTS

EVERYTHING FROM ONE SOURCE

L. B. FOSTER COMPANY
PITTSBURGH • CHICAGO • NEW YORK

RELAY RAILS

1000 GT 90# ARAB with 4-hole angle bars
400 GT 80# ASCE RAIL & BARS

50,000 Lundie Type Relay Tie Plates for 70# to 112# Rails

60# thru 112# NEW and RELAY TURNOUTS
New Bolts and Spikes Available

MORRISON RAILWAY SUPPLY CORP.
1437 BAILEY AVE., BUFFALO 12, N.Y.
Telephone TAylor 2400

MINING MACHINES

AC or DC
REBUILT & GUARANTEED
FOR IMMEDIATE SHIPMENT

COAL CRUSHERS
Single & double roll.

Electric Coal Drills, Mine Fans, Vibrating Screens, Electric Generators, Motors, etc.

CONVEYORS — Belt and Drag. Also gravity conveyors, bucket elevators, etc.

The INDUSTRIAL EQUIPMENT Corp.
(Established 1902)
910 First National Bank Bldg.
PITTSBURGH 22, PA.
Warehouse: Carnegie, Pa.

AIR COMPRESSORS:

12—Belted 360, 676, 870, 1000, 1300 ft.
12—Diesel 105, 315, 520, 676 & 1000 ft.
6—Electric 1300, 1500, 2200, 5000 ft.

CARS & LOCOMOTIVES:

100—50 ton cap. Gondolas.
35—50 ton cap. Flat Cars.
4—35 & 65 ton Diesel Locomotives.
6—10, 16, 20 & 30 ton Gas Locomotives.
150—8000 & 10000 gal. cap. Tank Cars.
20—12 yd. Std. ga. Steel Dump Cars.
1—50 ton G.E. Diesel Elec. Locomotive.

RUBBER CONVEYOR BELTS:

1000', 60", 600' 30", 300', 20", 1000', 42", 900', 48", 1450', 36", 1200', 24", 900', 18", 600', 16", 350', 14".

ELECTRIC LOCOMOTIVES:

15—3, 5, 8 ton Battery & Trolley.

DIESEL GENERATORS:

12—100, 150, 180 & 480 K.W.

MINE LOADERS:

17—GD9, Elmco 21, Conway 20, 50, 60 & 75 and Sullivan HL3.

STEEL TANKS:

6—50,000 and 100,000 gal. Tanks on tower.
30—8000, 10,000 and 20,000 gallon capacity.

SHOVELS — DRAGLINES:

7—1 yd., 1½ and 2 yd. Gas & Diesels.
16 yd. Elec. 160 ft. Boom Dragline.

R. C. STANHOPE, INC.
60 E. 42nd Street — New York 17, N. Y.

RELAYING RAIL

TRACK ACCESSORIES
MIDWEST STEEL CORP.
Gen. Off.: CHARLESTON, 21, W. VA.
Warehouses
CHARLESTON, VA.
KNOXVILLE, TENN. • PORTSMOUTH, VA.

RAILS—CARS

All sections of rails and good serviceable second hand cars, all gauges, also spikes, bolts, frogs, switches and ties.

M. K. FRANK
480 Lexington Ave., New York, N. Y. — Reno, Nevada
810 Park Bldg., Fifth Ave., Pittsburgh 22, Pa. — Carnegie, Pa.

FOR SALE
USED COAL MINING EQUIPMENT & SUPPLIES

COAL CRUSHERS
2—30" Single Roll Jeffreys.
1—36" St. Louis, Ring Type.
1—10x24 Jeffrey Sling-Hammer Mill.

COAL WASHERS
2—Rheolaveur Launders, 60-80 Ton Capacity, complete with Header, Feed Pipes, Supporting Frame, Dividing Head, Sampler, 10'x12' Steel Bin, etc.

COAL CUTTERS
10—Sullivan CE7 AC Short Wall Coal Cutters, with Tyrex Cable, etc.
1—7-BU Joy Loader, 250 Volts DC, thoroughly overhauled.

TROLLEY LOCOMOTIVES
5—4½ Ton Goodman, 36" Gauge, equipped with Power Reels and Crabs.
2—7½ Ton Goodman, 36" Gauge, Single End Control.

BELT CONVEYORS
1—36" Belt Conveyor, 50' Centers.
1—30" Belt Conveyor, 370' Centers, Motorized.
1—30" Belt Conveyor, 50' Centers, Motorized.
1—28" Belt Conveyor, 70' Centers, Motorized.
1—24" Belt Conveyor, 15' Centers, with Ding's Pulley.
1—24" Belt Conveyor, 75' Centers, with Ding's Pulley.
1—24" Belt Conveyor, 85' Centers, Motorized.

MACHINE SHOP EQUIPMENT
1—24"x10' American Quick Change Lathe.
3—Drill Presses, 16" to 28".
1—Pipe Threader up to 2", B.D.
1—Smith Electric Welder, 200 Amps.
1—Gould & Eberhardt Shaper, 18" Stroke, B.D.
1—Cleveland Combination Punch & Shear, B.D.
1—Power Hack Saw, B.D.
Air Hammers, Hand Shears, Swing Cranes with 1½ to 2 Ton Y & T Spur Geared Blocks.

PIT CARS
220—Card 1.7 Ton Capacity, R.B. Pit Cars, 36" Ga.
30—1.7 Ton Capacity Pit Cars with Whitney Wonder Bearing Wheels.
1—Card Rocker Dump Car, 90 Cu. Ft. Cap., 36" Ga.

OFFICE EQUIPMENT
2—Monroe Electric Calculators, Late Type.
1—Dalton Adding Machine with Stand.
4—L. C. Smith & Remington Typewriters, Desks & Wooden Files.
1—C. I. Office Safe.

MINE LAMPS
188—Edison Model P Mine Lamps, complete with Racks & Charger.

MINE TRANSITS
1—Ainsworth Outside Mine Transit, complete.
1—Eugene Dietzen Mine Transit, complete.

I-BEAMS
40 Tons—12" & 18" I-Beams, approx. 32' Lengths.

COKE EXTRACTORS
2—Coke Extractors, complete, 250 Volts DC, Std. R. R. Gauge, with new Spare Parts.

LARRY CARS
4—Connellsville Larry Cars, 250 Volts DC.

RAILROAD SCALES
3—100 Ton Fairbanks R. R. Scale, Steel I-Beam Stringers.

TROLLEY & INSULATED COPPER WIRING
Several Miles of 2/0, 4/0 & 400,000 cm. R.C. Stranded Copper Wire.
2/0 & 4/0 Rd. & Fig. 8 Trolley Wire.
Trolley Hangers, Frogs, etc.
Approx. 700' 4/0, 3-Cond. Armored Cable good up to 600 Volts (In two pieces).

MINE FANS
1—8-H60 Aerodyne Mine Exhausting Fan, with Air Locks, Hood, Man Cage, Hoist, Head Frame, etc. Pur. New 1942.

RAIL
75 Tons—65#.
100 Tons—60#.
30, 40 and 60# switches.

HOISTS — ELECTRIC
1—No. 22 Vulcan Hoist, complete with 40 H.P. Motor, Controller & Grids.
1—No. 22 Vulcan Hoist. complete with Man Cage, 30' Headframe & 40 HP. Motor.

MISCELLANEOUS
2—1935 Ford Busses (Later Motors) 40 passenger capacity.
Motors, AC & DC, 2 H.P. to 50 H.P.
Metal Mine Phones, Wall Phones, Jacks, New Supplies, etc.
Drag Chain Conveyors, with Dewatering Screens.
Flight Conveyors, 12", 24" and 30"—40 to 150 centers.

COMPLETE INVENTORY OF AMERICAN SMELTING & REFINING COMPANY'S HOLDINGS AT COKEDALE & BONCARBO, COLORADO, RECENTLY ACQUIRED BY US NOW AVAILABLE. GET IN TOUCH WITH US ON YOUR REQUIREMENTS.

FLORENCE
MACHINERY AND SUPPLY COMPANY

SUITE 904, EQUITABLE BUILDING **DENVER 2, COLORADO**

C. J. Parrish, Mgr.
Phone: Alpine 2803
Yards: Denver and Florence, Colo.

MINING MACHINES

Jeffrey: 2—35B, 28A, 250 V. 1—24B Low Vein. 4—29B, 29C, 29CE with shearing head. Also 1 on cats. Revolving head for 29C.

Goodman: 12A, 12AB, 12AA, 512, 12G3A, Shortwalls. 424, 24B, 124E3, Slabbers.
1—12G3, 220 volt and 2—2 DA, 500 volt.
2—Permissible Type 12CA, 6—112AA, Motors for 212AA, both 250 and 500 v.
1—Hitch Cutter for Cross Head timbers.
1—512 Goodman Shortwall Machine, 210 v.
2—Goodman Slabbing Machines, permissible type, 250 and 500 volts.

Sullivan: CE7, CE9, CE10, CR10 Low Vein.
1—Buddy Sullivan 220 Volt. 3 Phase.

SUBSTATIONS — 275 volts, D. C.

1—150 KW **G. E.** MG Set.
1—300 KW **Westing.** Rotary. As is armature needs rewinding.
1—150 KW **West.** MG Set.
1—100 KW **Ridgway** M-G Set.

LOCOMOTIVES

Goodman: All 250 volts.
1—6 ton, 30B, 43" 1—5 ton.
1—5 ton, 8-30 36" gauge.

Westinghouse: All 250 volts.
4—904 c. 44" 500 volts and 250 volt. Also 906 motors and 102-904-115.
Bar steel frames 10 ton, 6 ton, and 4 ton.

G.E.: All 250 volt.
6 ton 803, 44" as is.
6 ton 823, 44". 6 ton 819-821.
6 ton 801. 5 ton 825, 44" & 36".
8 ton 839. 8 ton 839 motors.

1—Battery Locomotive. 1½ ton Mercury, 30" gauge with charger.

LOCOMOTIVES

Jeffrey: 8 ton, 250 volts, type MH73. Locomotive motors and Crabs and Reels for Locomotives.

SPARE ARMATURES

Jeffrey: MH110, MH78, MH73 and MH64-350 V. and 500 V. 29 B, 35B and 28. 35BB. 35A, 29C, 29L, 35L.

Goodman: 34B, 30B, 30C, 12A, 2600 K and R; 12AB, 12AA, 33-1-4-T, 31-1-4-T, 32-1-4-T.

General Electric: 801, 807, 819, 821, 825, 839.

Westinghouse: 904, 905, 906, 102, 907, YR2. 115. Also 200 KW.

Westinghouse Rotary Converter Armature: 250 V. Bracket Type, 150 KW G.E., HCC Bracket Type.

Sullivan: CE7, CE9 and CE10.

OTHER ITEMS AVAILABLE

Aerial Tramways.
Automat Loader: 1 Myers-Whaley #4.
Belt Conveyors: 1 Bucket Elevator Conveyor.
Bit Sharpeners, 2 Sullivan, 1 Diamond.
Blue Print Machine: 42" wide, continuous Mercury Arc Light.
2 **Loading Booms,** 30'x5'.
Bond Welders: Resistance.
Circuit Breakers: AC and DC.
Circuit Breakers, Automatic: 250 volt 600 amps.
Circuit Breakers, Manual: 600 amps to 3,000 amps.
Clam Shell Bucket: 1¾ cubic yard.
Coal Crushers: (double roll) 16"x16", (single roll) 24"x30", 24"x24", 36"x36", 30"x60", 30"x30", 18"x18", 12"x16".
Compressors.
Drop Bar Supports: (Goesenck) 29B and 29C.

OTHER ITEMS AVAILABLE

Dumps: Crossover.
Field Frames.
Generators: DC 250-275 volt. 30 KW to 100 KW.
Hoists.
Hoists: overhead, AC 3-60-440 1 ton and 2 ton. Crabs and Room Hoists.
Lathe: 48"x14' with Taper Attachment and 3-60-220 Motor.
Lathes, Switches.
Loading Machines and Goodman Shaker Conveyors and Duckbills.
Milling Machines, horizontal and vertical.
Mine Cars: 48" gauge.
Mining Machine Trucks.
Motors: Miscellaneous and 1—5-HP Fynn Weichsel, 1800 RPM, 200 Volt Slipring or synchronous.
Motor Starters and Controlers: AC and DC.
Plants: Diesel Power. 55 KVA Rotary Transformers, Voltage 23100/208. Synchronous Motor Starters, full Magnetic Across-the-line, 3 phase, 60 cycle, 150 Volts—2-2—H.P. and 6—250 H.P. Westinghouse.
Pumps: Rebuilt and New.
R. R. Switches: 85# to 100#.
Shaker Conveyors and duckbills.
Slate Larry: 2—5BU on Cats. 2—Myers-Whaley, #3 and #4.
Spare Motors: DC and AC for mining machines and locomotives.
Switchboards.
Speed Reducers.
Transformers.
Tripmakers: 2 car haul.
Welders: AC 220/440 volts, 350 and 400 amp.
1—Spot Welder, 50 KVA, 220 Volts.

GUYAN MACHINERY COMPANY, Logan, W. Va.

REBUILT MINING MACHINES

6—112 AA Goodman 250 Volts
1—112 G3A Goodman 220 Volts
2—12 A and 12 AB Goodman 250 Volts
4—CE 7 Sullivan AC and DC

LOCOMOTIVES

1—8 ton Goodman 250 Volts 36" Gauge
4—8 ton GE 250 Volts 36" gauge
1—6 ton GE Trolley and Battery combination
2—6 ton Goodman type 2600 250 Volts

LOADING MACHINES

2—7 BU Jays 250 Volts 42" gauge
4—5 BU Jays 250 Volts 42" gauge

THOMAS GILLESPIE & SON

State Road 67, BICKNELL, IND.
Phones 179 and 149-K

HIGH GRADE TOOLS

2½" Bar Cleveland Horiz. Boring Mill.
3" Bar G & L Horizontal Boring Mill.
21" Cincinnati Bickford Up. Drill.
17"x6' LeBlond Grd. Head Lathe.
18"x18' Sidney Monotrol Lathe.
24"x12' Boye & Emmes Lathe.
30"x18' LeBlond Q.C. Lathe.
#3B Milwaukee Plain Miller.
#3 Cincinnati Universal Miller.
#3 Cleveland Universal Miller.
3' and 3½' Cincinnati Radial Drills.
16" and 24" G & E Shapers.
16" Cincinnati B.G. Shaper.
28" G & E Shaper.
24"x24"x6' Ohio Planer.
36"x36"x14' American Planer, 4 heads.
Have various other machines in stock.

Send us your inquiries

Cincinnati Machinery Company, Inc.
217 E. Second Street, Cincinnati 2, Ohio

LOCOMOTIVES

American and Lima 80 ton steam switching locomotives new 1944. Type 0-6-0, 6 wheel equipped with tender. Engines are of the latest construction in like new condition, available at very attractive price. Specifications available. Also have several diesel and gasoline locomotives available from stock.

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WIRE ROPE FOR SALE

Brand New—Ind. Wire Rope Center, 1¼" dia. 6x19. Plow steel. Various lengths from 160 ft. to 3,000 ft. each reel. Also other sizes. Send for list.

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Some Steam Engines and Boilers available only slightly above the metal price

BRADFORD SUPPLY COMPANY
WAYNE, WOOD COUNTY, OHIO Near Toledo

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New and Used
Large stocks, all sizes attractive prices

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EVERYTHING NECESSARY FOR BELT CONVEYORS AND BELT ELEVATORS

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REBUILT EQUIPMENT—READY TO SHIP

MOTOR GENERATOR SETS—250 V. D.C. (Motors 220/440 or 2200 V., 3 Ph., 60 Cy.)

No.	KW.	Make	Speed
2	40	West.	850
5	50	West.	1200
2	75	Star	1200
2	75	G.E.	600
4	100	Star	1200

D.C. GENERATORS—250 Volts—D.C.

No.	KW.	Make	Speed
10	10	West.	1150
11	15	West.	1400
3	15	West.	1150
2	20	West.	1400
3	20	West.	1150
5	25	West.	1400
4	25	West.	1150
3	40	West.	850
5	50	Louis Allis	1150
4	75	Star	1150
5	100	Star	1200
3	125	Star	1150

ENGINE GENERATOR SETS

1—35 KVA 220/440 v., 3 ph., 60 cy., dir. con., Ridgway Steam Engine.
3—100 KW, G.E. 250 v., DC Gen. Motors Diesel.
1—125 KVA 240/480 v., 3 ph., 60 cy., West. dir. con., to Erie Ball Engine Electric Light Plants—gas, Gasoline and Diesel AC and DC—1 KW, 2 KW, 5 KW, 7½ KW, 10 KW, 25 KW, 60 KW and 100 KW.

AC GENERATORS—2200/4000/440/220 V.

1—110 KVA Allis Chal., 277 rpm.
1—450 KW. Elec. Mach., 120 rpm.
1—1250 KW. West. 80% P.F., 1200 rpm.

D.C. MOTORS — 230 Volts

No.	HP.	Make	Rpm.	Type
20	½	West.	1750	CDH
12	¾	West.	1750	CD
18	¾	Wagner	1725	—
15	¾	West.	1140	CD
47	1	West.	1725	CD
30	1	West.	1140	CD
6	1	West.	865	CD
18	1½	West.	1725	CD
17	1½	West.	1180	CD
14	1½	West.	900	CD
23	2	West.	1725	CD
26	2	West.	1150	CD
20	2	West.	850	SK-23
20	3	West.	1725	CD
25	3	West.	1150	SK-23
15	3½	West.	850	SK-30
20	5	West.	1800	SK-20
44	5	West.	1150	SK-30
20	5	West.	850	SK-43
15	7½	West.	1750	SK-33
16	7½	West.	1150	SK-43
10	7½	West.	975	——
6	7½	Cr. Wh.	875	CCM
8	7½	West.	850	SK-60
4	10	West.	1750	SK-43
10	10	West.	1150	SK-60 & 63
15	10	West.	850	SK-70
14	15	West.	1150	SK-83
3	15	Reliance	1150	66-TF
2	15	West.	900	SK
1	20	G.E.	3500	CD
4	20	West.	1750	SK-83
2	20	West.	1150	SK-93
3	20	West.	900	SK-100L
5	25	West.	975	——
5	20	West.	1150	SK-103
2	25	West.	850	SK-120
1	25	West.	600	SK-130
3	55	West.	650	SK-121
3	125	Star	1150	——
1	150	Cr. Wh.	1150	——
1	200	Cr. Wh.	1150	——

COAL CONVEYOR

2—Portable drag type 30' long, 15" wide, drag plates 14¼" x 4" driven by Wisconsin 4-cylinder V-type gasoline engine.

A.C. MOTORS—4000/2200/220/440 V.—3-Ph., 60 Cy.

No. HP.	Make	Rpm.	Type
1 500	Elec. Mach.	120	Syn.
1 750	West.	1200	Syn.
1 1000	West.	1200	Syn.

HOISTS

200 Room Hoist with ¼" cable with AC or DC Motors.
Car Pullers—75—Car Pullers with ¼" cable equipped with DC or AC motors, or can be operated by hand.
Winches—150 Winches—1½ Ton capacity with cable, hand operated or with DC or AC motors.

CONVEYORS

3—G-20 Goodman Shaker Conveyors each with a Goodman Duck Bill complete with motor equipment with 250 v. DC motors.

1—35 HP. single drum, double reduction Diamond Machine Co. Drum, 19" dia. x 18" F with " flanges. Hoist has friction clutch and brake with hand operating levers.

PUMPS—Equipped With AC or DC Motors

1—11 GPM 460 ft. head Worthington Oil Pump.
1—60 GPM 479 ft. head Gould Pump.
1—100 GPM 50 ft. head Dayton Dowd Pump.
1—130 GPM 50 ft. head Dayton Dowd Pump.
1—160 GPM 50 ft. head Dayton Dowd Pump.
1—195 GPM 200 ft. head National Transit Pump.
1—210 GPM 60 ft. head National Transit Pump.
1—220 GPM 231 ft. head 3½" x 3" Blackmer pump.
2—243 GPM 100 ft. head Dayton Dowd Pumps.
1—300 GPM 90 ft. head Dayton Dowd Pump.
2—300 GPM 20 ft. head Gardner-Denver Pumps.
3—378 GPM 44 ft. head Dayton Dowd.
1—450 GPM 104 ft. head Dayton Dowd Pump.
1—500 GPM Morris Machine Wks. 4" suc., 4" dis., 123 ft. head, 1760 rpm.
1—550 GPM 88 ft. head Dayton Dowd Pump.
3—750 GPM 70 ft. head Dayton Dowd Pumps.
1—4000 GPM 138 ft. head Ingersoll Rand Pump.

SPECIAL

24—NEW 10 KW. 120 V., Delco Generators, 1200 rpm.

COMPRESSORS

2—315 CFM. Ingersoll Rand Portable, 100 lbs. pres., driven by 105 HP. Waukesha Oil Engines, 860 rpm.
AC and DC MONORAIL HOISTS—¼ to 3 Ton Capacity.
VARIABLE SPEED MOTORS—230 V. DC —from 1 to 165 HP.
AC MOTORS—from ½ to 150 HP. squirrel cage and slip ring.
2—30-Ton Vertical BLISS PRESSES.
3—RADIAL DRILLS.
WELDING SETS—200 to 500 amp. capacity.
NEW AC STARTERS—Across the line—½ to 60 HP.
NEW DC MAGNETIC STARTERS—1 HP. to 25 HP.

DUQUESNE ELECTRIC & MFG. CO., PITTSBURGH [6], PA.

Montrose — 5800

FOR SALE — ALL MACHINERY, EQUIPMENT AND SUPPLIES

Of a Completely Mechanized Conveyor Mine

3 Track Steel Tipple bins, hoppers, feeder, shaker, screens, conveyors, chutes, picking tables, loading booms, crushers, refuse disposal equipment, 440 volt, 3 phase, 60 cycle motors, 2,500 tons per day capacity.

Locomotives—Westinghouse 908 C's, 13-ton, 250 volt. 904 C, some with crabs, 250 V.

CUTTING MACHINES

Goodman 112 C A's, shortwalls, flame proof, 250 Volt D.C., rebuilt at Goodman shops.

Drills, Jeffrey A-7's.

HOISTS

250 HP. double conical drums, headframe, cages. 75 HP. single drum slope hoist, 600' ⅞" rope.

RELAYING RAILS

700 tons, 85 lb., 60 lb., 40 lb., 25 lb., 16 lb., switches, ties.

CONVEYORS

Shakers and Belts.
Goodman G 12½ permissible.
Goodman 20" Belt Conveyors.
Goodman A I G Duckbills.
Goodman G 20 permissible.

FANS

6' Aereodyne Jeffrey centrifugal.
2—Chain Car Hauls.

POWER

Transformers, 150 KVA.
G. E. Motor Generator, 360 KW.
2,300 Volts, 3 ph., 60 cycle.
Type M P C 1,200 RPM, 275 DC.

17 PUMPS

All acid resisting, gathering and centrifugal.

MISCELLANEOUS

Axes, picks, shovels, bolts, rivets, steel, brattice cloth, spikes, bearings, spare parts, trolley and feed line hangers and clamps.
Copper, 6/0, 4/0, 2/0, 1,000,000 cm, 750,000 cm, 500,000 cm, rail bends.

SHOP EQUIPMENT

Drill-presses, shears, benders, band saw, trip hammer, grinders, bit sharpener, chain blocks, hand tools, blacksmith tools.

SAFETY

First aid boxes, stretchers, surgical supplies, oxygen breathing apparatus, gas masks, safety lamps, M S A Portable Rock duster.

MINE CARS

342 composite wood and steel cars.

MOTORS

150 HP G.E. 2,200 Volt, 3 ph., 60 cycle, 575 RPM.
West. 150 HP., 2,200 Volt, 3 ph., 60 cy.,
Wagner 35 HP., 440 AC.

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FOR SALE

CRUSHERS

1—Stephens Adamson 30x30 double roll crusher. Will crush from 20" down to 1¼".
1—Link Belt 30x60 double roll crusher, equipped with gear drive.
2—McNally Pittsburgh 24x30 single roll crushers.
1—American Pulverizer crusher #1627. Type AC, machine number AC3B, crushes from 20" down to ½".
1—Jeffrey 24x24 single roll crusher, Serial #1798, Flat pulley driven.
1—Link Belt, 20x20 double roll crusher.

MINING MACHINES

2—Goodman Universal G3, AC mining machines, 3 phase, 60 cycle, 220 volts, complete with trucks, cable reels and cable.
1—Sullivan CLE5, AC longwall mining machine, 3 phase, 60 cycle, 220 volts complete with cable.
2—Sullivan type CH8, AC longwall mining machines, 3 phase, 60 cycle, 220 volt, 30" cutter bars, complete with 300' each of 3 conductor mining machine cable.
1—Sullivan CE7, AC shortwall mining machine, 3 phase, 60 cycle, 220 volts, 44" gauge, 6½" cutter bar. Complete with tip turn trucks.
6—Goodman type 512DG3A, AC shortwall mining machines. Complete with cable and jacks. 8' cutter bars. No trucks.
1—Jeffrey 35BB, AC shortwall mining machines. 6' cutter bars, complete with tip turn trucks, cables and reels.
2—Goodman Universal 112AA, AC shortwall mining machine, 3 phase, 60 cycle, 220 volts, 6' cutter bar. Complete with cable and reel.
1—Sullivan shearing machine type CH11, 250 volts DC, 42" gauge, 7½' cutter bars.
1—Sullivan shearing machine type CH13, AC, 3 phase, 60 cycle, 220 volts, 36" gauge, 7½' cutter bar.

FAN

1—Bayley #17 Plexiform fan, Type F, wheel diameter, 93½", circumference, 24.478 ft., outlet area, 39.376 sq. ft. Capacity ranges from 39,376 CFM at outlet velocity of 1,000 to 141,759 CFM at outlet velocity of 3,600.

LOCOMOTIVES

1—6 ton Goodman locomotive, serial number 4227, type 3304T, steel tires, plain bearings, 36" gauge.
2—4 ton Westinghouse locomotives, serial numbers 46077 and 46353, ball bearing, 36" gauge.
1—5-ton Goodman locomotive type W12A5, #963, overall dimensions, length 11', height 30", width 47", wheelbase 31", 42" gauge.
1—6-ton G.E. locomotive, classification LM2T6MM5—serial number 5837, 250 volts DC, 36" gauge, 45" wide overall, height 33", overall height 38½", wheelbase 44", 30" wheel diameter, overall length 13', R86E type controller.

ROTARY CONVERTER

1—Westinghouse rotary convertor, 100 KW, 250 volts, DC, 400 DC amps, 6 phase, 60 cycle, 1200 RPM, serial No. 2278244, complete with Westinghouse Electric STR transformer, 110 KVA, 203 GA oil, 4000—188—94—59 volts, 60 cycle, style 215811A, serial No. 524349. This unit is equipped with hand operated switchboard.

BELT CONVEYOR

2—Goodman units complete with 2,510 feet of 30", 4 ply belt. One unit, 1000 feet long, and one 200 feet long. These units are complete and are approximately six months old. Like new having had very little use.

HOISTS

All types and sizes of hoists with and without motors.
1—Ottumwa Iron Works single rigid cylindro-conical drum hoist, serial number 4080, complete with remote control and hydraulic brakes, constructed for following hoisting conditions: Weight of cage 6000#, weight of car 1600#, weight of coal average 2500#, total cage travel 277 ft. (HMD) size of rope 1⅛", trips per hour 78, rest period, 15 sec. Balanced hoisting without slack rope, end lift. Post brake 72" diameter; 8" face. Direct connected to Western Electric 150 HP motor, 3 phase, 60 cycle, 2200 volts, slip ring, speed full load, 700 RPM, complete with automatic switchboard.

Other types and sizes of hoists, with and without motors.

BELT

1—Lgth. Rubber Belt 329'5", 48" wide, 32 oz., 5 ply.

PUMPS

All sizes and types of pumps.

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GAVENDA BROTHERS
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ROTARY CONVERTERS

500 KW GE. SYN. 275 V., 6 Ph., 60 Cy., 1200 RPM. Pedestal Type. 2300 V. Transformer and Switchgear.

300 KW GE. SYN., 575 V., 6 Ph., 60 Cy., 1200 RPM. Pedestal Type. 2300/4000 V. Transformers and Switchgear.

300 KW GE. SYN., 575 V., 6 Ph., 60 Cy., 1200 RPM. Pedestal Type. 11500/13200 V. Transformers with Complete Full Automatic GE. Switchgear.

MOTOR GENERATORS

500 KW GE. SYN., 575 V., 2300/4000 V., 3 Ph., 60 Cy., 900 RPM. Complete Manual Switchgear.

300 KW RIDGWAY SYN., 275 V., 2200 V., 3 Ph., 60 Cy., 1200 RPM. Complete Manual Switchgear.

200 KW GE. SYN. 275 V., 2300 V., 3 Ph., 60 Cy., 720 RPM. Complete Manual Switchgear.

150 KW WEST. SYN., 275 V, 2300 V., 3 Ph., 60 Cy., 900 RPM. Complete Manual Switchgear.

LOCOMOTIVES

13-T G.E., 500 V., HM-827 Mts., 36"-42" Ga.
10-T JEFFREY, 250 V., MH-110 Mts., 44"-48" Ga.
10-T WEST., 500 V., 907-C Mts., 36"-44" Ga.
10-T WEST., 250 V., 907-C Mts., 36"-44" Ga.
8-T WEST., 250 V., 906-C Mts., 42"-48" Ga.
6-T G.E., 250 V., HM-701 Mts., 22"-32" Ga.
6-T WEST., 250 V., 903-B Mts., 22"-30" Ga.
6-T JEFFREY, 250 V., MH-88 Mts., 36"-42" Ga.

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400 AMP Lincoln Welders, 3 Phase, 220-440 Volt.
Two Steam Locomotive Crane, standard gauge, 50 ft. booms.
4/0—3/0 Round and Grooved Wire.
300,000-500,000-750,000 Circular Mils Cable. Bare and Insulated.
6-lb., 10-lb., 12-lb. Sledge Hammers.
4/0 Copper Rail Bonds 7 Inches Long.
Asbestos Mittens $12.00 Per Doz.

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Immediate Shipment

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3'x6'—2 deck Vibrat. Screen	595.00
3'x8'—1 deck Vibrat. Screen	585.00
3'x8'—2 deck Vibrat. Screen	685.00
3'x8'—3 deck Vibrat. Screen	885.00
Stoker Coal Crusher	395.00
Large Coal Crusher	895.00
Coal Crusher with capacities to 215 T.P.H.	2950.00
15 Ton Truck Scale	450.00
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5 Ton Tipple Scale	260.00

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1½ to 10 Ton 13" to 56" Track Gauge
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Greensburg, Pa.

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FOR REBUILT MINING EQUIPMENT

GOODMAN SHAKER CONVEYORS
3—Goodman G 20 Shaker Conveyors with 250 v. 20 HP motors, also Goodman #3 Duck Bills.

MINING MACHINES
35—B Jeffrey 250 v. Permissible, 7½' bar.
35—B Jeffrey 500 v. Permissible 7½' bar.
2—29 C Jeff 250 v. HP 250 v. 6' Bar, rebuilt.

STORAGE BATTERY LOCOMOTIVES
1—6 Ton G.E., permissible 36/44 Ga. HM 825 BB
4 Ton 36" Ga. Atlas 2 BB Motors.
5½ Ton Type D Ironton, 42" Ga.
2—5½ Ton Ironton Type A, 36/42" Ga.

Haulage & Gathering Locomotives
13 Ton Westgh. 250 v. 36" or 40" Ga.
10 Ton Jeffrey MH 110, 250 v. 36/42" Ga.
3—6-ton G.E. 250 v. HM 803 BB Motors, 36" Ga. O.S. Rolled steel frame with flat type motor driven reel.

COAL CRUSHERS
18x24 and 18x30 New Scottdale dbl. roll.

Rotary Con. & MG Sets (3 ph. 60 cy.)
300 KW G.E. HC 12, Rotary, 275 v. 600 RPM.
100 kW Burke 250 v.—220/3/60 Syn.
100 KW Burke 125 v.—2200/440/220 Syn.
50 KW G.E. 125 v.—75 HP G.E. 2200 v. 440/220 v.
35 KW Cr. Wh. 250 v.—50 HP 220/440 v.
7½ KW Wooten 125 v.—10 HP Wooten Vert.
3—New 10 KW 125 v.—220/440/8/60.

DC MAGNETIC STARTERS
New 230 v. DC Magnetic Cutler Hammer. Starters, 25, 40, 50, 60, 75 & 100 HP.

SLIP RING & SQ. CG. MOTORS

HP	Make	Speed	WDG	Type
1400	West.	1200	Syn.	New 1 P.F.
1000	West.	1200	Syn.	New 8 P.F.
750	West.	1200	Syn.	New 7 P.F.
350	G. E.	900	S.R.	I-M
300	West.	1800	S.R.	CW
250	West.	277	S R.	CW 1314
200	G. E.	240	S.R.	MT 412
200	West.	350	S.R.	CW
100	West.	1750	S.R.	C-I
100	G. E.	500	S.R.	M 1-25-cy.
75	G.E.	865	S.C.	I K
50	West.	580	S.R.	CW 658 D
50	G.E.	900	S.R.	I-M

HOISTS, CRANES & PUMPS
400/500 HP Flory slope Fixed drum 6' dia., 5' face, 9" flanges—22000# rope pull.
400 HP Vulcan conical drum Shaft Hoist
1—50/75 HP 2 drum Meade Morrison slope.
75 HP Ottumwa slope with AC Motor.
75 HP Vulcan 2 drum shaft, S.R. Motor.
40 HP Lidgerwood sgl. fr. drum geared to A.C.
1—1 Ton AC Monorail 220/3/60.
2—Fairmont Car Retarders.
10 Ton Larry Car 500/250 v. DC.
10 HP Fridy Car Puller, AC Motor.
15 HP Ottumwa sgl. fr. dr.—15 HP. SK 230 v.
4—2720 GPM 85' Le Courtney Bronze fitted 10".
1—700 GPM 60' Wheeler Bronze Fitted 5" Cent.
625 GPM 12' Hd. DeLaval 10 HP 230 v. DC.
300 GPM 44' Hr. DeLaval 10 HP, 230 v. DC.
300 GPM 35' Hd. DeLaval 1½ HP, 230 v. DC.
150 GPM 53' Hd. DeLaval 5 HP, 230 v. DC.

DC MOTORS GENERATORS, 230/250 v.

HP	Make	Speed	Wdg.	Type
1200KW	Al. Ch.	750	cpd.	500 v.
1500	West.	600	sh.	600 v.
175	G. E.	475	ser.	MD 109
130	G. E.	550	ser.	CO 1812
100	G.E.	480	ser.	MD 108
50	Northern	600	ser.	K
50	West.	565	cp.	SK 500 v.
50	West.	250/1000	sh.	SK
50	Reliance	1750	cp.	166 T
40	G.E. (Vert)	1750	cp.	CD 93
40	Roth	1500		
35	Cr. Wh.	700	sh.	CM
20	West.	750		
15	West.	850	cp.	SK 93
15	Wh.	800	sh.	CM
15 (4)	C. Wh.	1400/1700	sh.	CM
18	West.(Enc.)	825	cp.	SK 113
10 (3)	G.E.	1750	sh.	CD
7½	G.E.	1750	sh.	RL

AIR COMPRESSORS
1200 cu. ft. 100# Worthington 2 stage Belted.
2250 CFM 100# Worth.—450 HP. West. Syn.
750 CFM 100# Ch. Pn.—150 HP West. Syn.
2—373 cu. ft. 100# Bury—AC Motors.
173 cu. ft. 100# Pres. Chic. Pneu. Belted
1—90 cu. ft. 100# Pres. Chic. Pneu. Belted.
1—75 cu. ft. 100# Chg. Pneu.-AC Motor.

AC MAGNETIC STARTERS (3 ph. 60 cy.)
200 HP G.E. Rev. Hoist Control, 2200 V.
1—200 HP, 440 v. Enc. starters for S.R.
1—200 HP, 440 v. Enc. reduced v. Comp.
1—150 HP, 440 v. Eng. reduced v. Comp.
7—150 HP, 440 v. Enc. across line switches.
1—125 HP, 440 v. Enc. reduced v. Comp.
7—75 HP, 220 v. Enc. across line switches.

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½ to 100 HP — All Ratios
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14" to 36" Wide — Anti-Friction

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½ HP to 200HP—All Speeds & Types

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Take ups, pulleys, screw conveyors, manganese buckets, pillow blocks belting, chain drives, gears, etc.

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1001 Lima Dragline 3 Yd.
101 Lima Dragline & Shovel 1¼ Yd.
401 Koehring Dragline & Shovel 1 Yd.
104 Northwest Dragline & Shovel 1 Yd.
Speeder Shovel ¾ Yd.

Parmanco Horizontal Drill

Central States Construction Co.
Box 149
Logan **Ohio**

FOR SALE
Jeffrey 26" Belt Conveyor, 500 ft. centers. Heyl & Patterson 60" Belt Conveyor, 25 ft. centers. 2—Westinghouse 5-ton Trolley Locomotives, 36" gauge, 125 volts, AC and DC Mining Machines.
BERRETTINI ELECTRIC CO.
376 N. Main Street **Plains, Pa.**

FOR SALE—PIPE MACHINE
12" Williams (Oster) complete with variable speed motor and controls and very large assortment of new and used dies. GOOD CONDITION. Price $700.00.
THE OHIO DRILLING COMPANY
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FOR SALE
2 Pan Type Loading Booms. Approximately 40' long—one 4' wide, one 5' wide.
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SHOVELS—DRAGLINES DRILLS—ETC.

Model 618 Page Diesel Dragline. 110′ boom, 2 yard bucket.
Model 1201 Lima Combination High Lift Shovel and Dragline. 42′ boom, 32′ stick, 2½ yard dipper, dragline boom 85′, bucket 3 yards.
Model 1201 Lima Diesel Dragline. 80′ boom, 3 yard bucket, Type L Cummins engine.
Model 100 Osgood 2½ yard Shovel. 85′ dragline boom, 2½ yard bucket, 25′ 6″ boom, 18′ stick, Kohler light plant, D17000 Caterpillar engine.
1001 Combination High Lift Lima Shovel and Dragline. 36½′ boom, 27′ stick, 2½ yard dipper, 80′ boom, 2½ yard bucket.
Model 1001 Lima Diesel Dragline. 80′ boom, 2½ yard bucket. Waukesha-Hesselman engine.
908 Osgood Dragline. 85′ boom, 2 yard bucket, D17000 Caterpillar engine, Kohler light plant.
95 Lorain Dragline. Waukesha-Hesselman Diesel engine, 75′ boom, 2 yard bucket.
44-B Bucyrus-Erie Diesel Shovel. 2 yard dipper, 6 cylinder Buda diesel engine.
43-B Bucyrus-Erie Diesel Shovel. 1¾ yd. dipper, 6 cylinder Buda diesel engine.
Model 855 P&H Long Crawler Dragline. Hydraulic control. 78′ boom, 2¼ yard Page bucket, D17000 Caterpillar diesel engine.
4101 Marion Electric Dragline. 90′ boom, 2½ yard bucket.
Model 850 Lima Combination Shovel and Dragline. 22′ shovel boom, 19′ dipper stick, 2 yard dipper. 75′ dragline boom, 2 yard bucket; 18′ 11″ crawlers for dragline operation. 7x7 Waukesha-Hesselman oil engine. A-1 shape.
Model 750 2 yard P&H Combination Diesel Shovel and Dragline.
Lorain 80 1¾ yard Shovel and Dragline. Caterpillar diesel engine.
Model 8 Northwest Dragline. Murphy Diesel engine, 70′ boom, 2 yard bucket.
352 Marion Combination 1¼ yard Shovel and Dragline. D13000 Caterpillar engine. Like new.
Model 603 Lima 1½ yard Combination Diesel Shovel and Dragline.
Link-Belt ¾ yard Speeder Shovel and Clam. Completely rebuilt.
Model 200 ½ yard General Shovel. Seven months old. Like new.
Bucyrus-Erie 10B Combination Shovel, Dragline and Backhoe.
Model 44 Loomis Clipper Blast Hole Drill with new Hercules engine. Like new.
Brand New Parmanco Horizontal Auger Drill.
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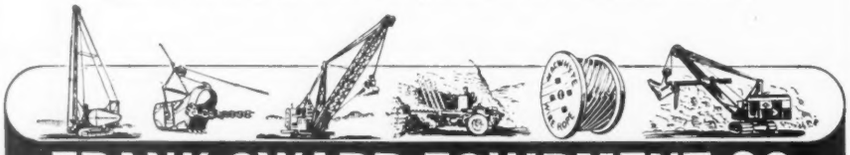
We try to carry in stock various sizes of Page automatic dragline buckets. We may have the size you need for immediate delivery.



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Hazleton National Bank Bldg., Hazleton, Penna. Phones: 4310-J and 4311

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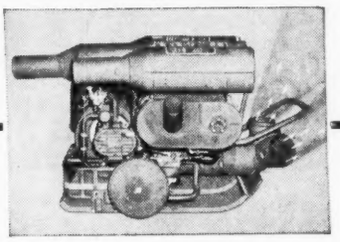

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MINE USE

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HEATING—Mills, Bunkhouses, Dry Rooms, Large Boarding Houses, Shops, Sheds, Warehouses, Buildings Under Construction, Spot Heating, etc.
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ORIGINAL COST $583.00
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20x22″ SKINNER Universal Unaflow Steam Engine, right hand, center crank poppet-valve type, operates with a pressure of 125 to 150 lb. at throttle, 0 to 1 lb. back pressure. Direct connected to a 220 KW, 230 volt, 200 rpm General Electric Type MPC, Form LD, direct current Generator.

13x15″ SKINNER, left-hand, center crank, single-valve automatic engine of the steam-tight-valve counterflow type, operates with a pressure of 150 lbs. at throttle, 0 to 1 lb. back pressure. Direct connected to a 100-KW, 250 rpm, 230-volt direct current Triumph Electric Co. Generator.

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ONE DAY SHIPMENT

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1,120 ft. 36 in. 7 ply — Used
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1,075 ft. 30 in. 5 ply — New
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Immediate Delivery

78—50-Ton, All Steel, Twin HOPPER CARS. 1,880 Cu. Ft. Capacity. Cast Steel Side Frames and Bolsters.

Good Condition.

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AMERICAN PULVERIZER
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Complete with V-Belt Sheave
Excellent condition - Immediate delivery
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This unit is complete with 475 HP direct connected DC motor; MG set 350 HP, 6,600 V., 3 Ph., 60 Cy. Wound Rotor Motor direct connected to fly-wheel and 400 KW DC Generator. Control panel with primary and secondary control of motor and DC control for generator and DC Hoist Motor.

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The above described equipment has been inspected by our engineers. The bins, structure, and machinery are in first class condition. Designed and built by Link-Belt.

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ABRASIVE RESISTANT COVERS

Width	Ply	Top-Bottom Covers
48"	8	1/8" — 1/16"
42"	5	1/8" — 1/16"
36"	6	1/8" — 1/16"
30"	6	1/8" — 1/16"
30"	5	1/8" — 1/16"
26"	5	1/8" — 1/32"
24"	5	1/8" — 1/32"
24"	4	1/8" — 1/32"
20"	5	1/8" — 1/32"
20"	4	1/8" — 1/32"
18"	4	1/8" — 1/32"
16"	4	1/8" — 1/32"
14"	4	1/16" — 1/32"
12"	4	1/16" — 1/32"

Inquire For Prices — Mention Size and Lengths

TRANSMISSION BELTING

HEAVY-DUTY FRICTION SURFACE

	Width	Ply	Width	Ply	Width	Ply
Inquire For Prices — Mention Size and Lengths.	18"	6	10"	6	6"	5
	16"	6	10"	5	5"	5
	14"	6	8"	6	4"	5
	12"	6	8"	5	4"	4
	12"	5	6"	6	3"	4

ENDLESS "V" BELTS

"A" Width All Sizes —
"B" Width All Sizes —
"C" Width All Sizes —
"D" Width All Sizes —
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Sold in Matched Sets.
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APPROVED SPECIFICATION HOSE EACH LENGTH WITH COUPLINGS ATTACHED

I.D. Size	Length	Per Length
2½"	50 feet	$28.00
	25 "	16.00
2"	50 "	23.00
	25 "	13.00
1½"	50 "	20.00
	25 "	11.00

Specify Thread On Couplings

AIR HOSE

I.D. Size	Length	per Length	Universal Couplings
½"	25 feet	$5.00	$1.50 Pair
	50 "	10.00	1.50 Pair
¾"	25 "	7.50	1.50 Pair
	50 "	15.00	1.50 Pair
1"	25 "	10.00	1.50 Pair
	50 "	20.00	1.50 Pair

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WATER HOSE

I.D. Size	Length	per Length
¾"	25 feet	$4.25
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1"	25 "	6.25
	50 "	12.50
1¼"	25 "	7.50
	35 "	$10.50
	40 "	12.00
	50 "	15.00
1½"	25 "	10.00
	35 "	14.00
	50 "	20.00

Each Length with Couplings Attached

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LANSDOWNE, PA.

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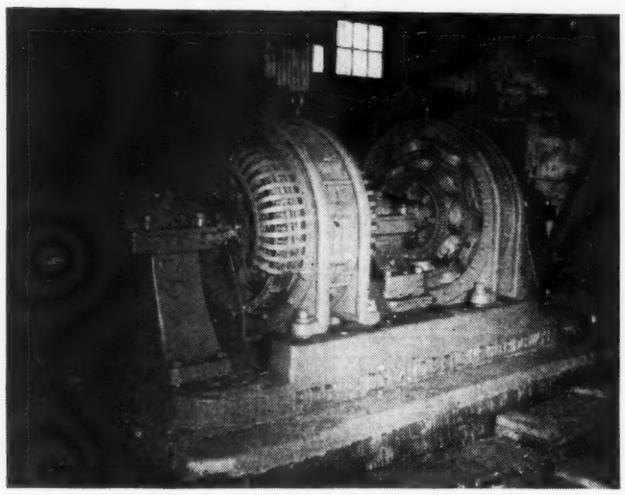
COMPLETE LIQUIDATION

IMMEDIATE DELIVERY

... Three and one-half million dollars in new and nearly new coal mining machinery and equipment

Jeffrey Arcwall 29 L-E Mining Machine



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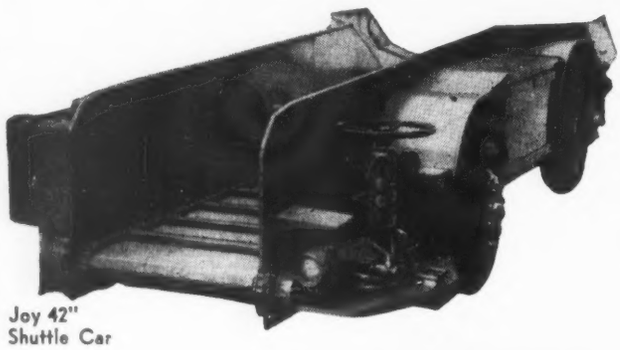
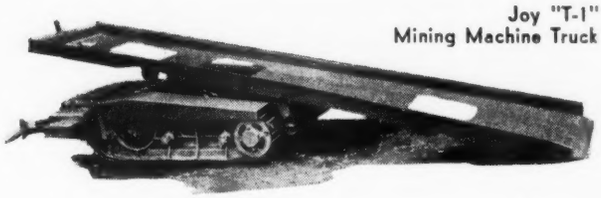
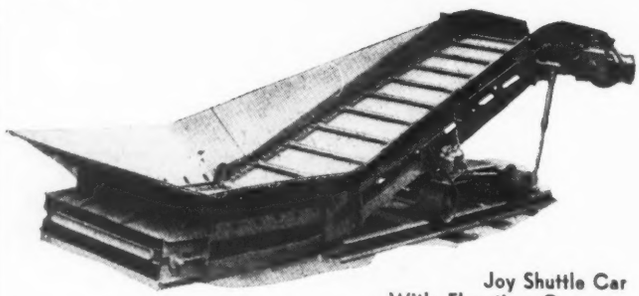


Joy 42"
Shuttle Car

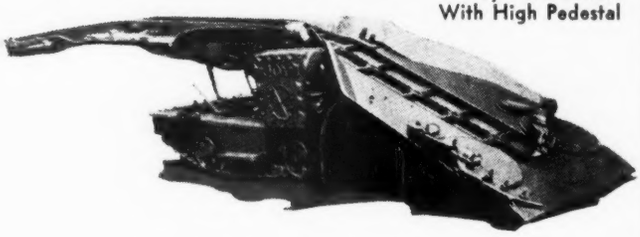
Joy "T-1"
Mining Machine Truck





Joy Shuttle Car
With Elevating Conveyor

Joy 7-BU Loader
With High Pedestal



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Portland Equipment Co.
11 Broadway, New York 4, N. Y.

THE COLUMBINE MINE EQUIPMENT CO., INC.

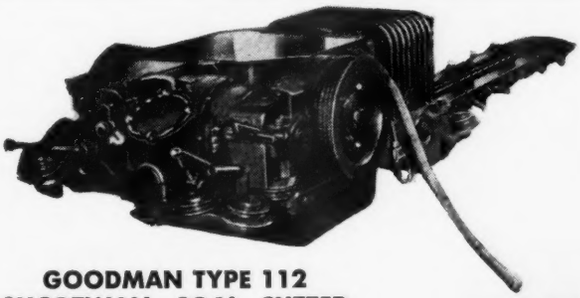
1669 BROADWAY, DENVER 2, COLORADO

SEE PAGE 185 FOR APPROXIMATE SUMMARY OF HARD-TO-GET OFFERINGS

COMPLETE LIQUIDATION

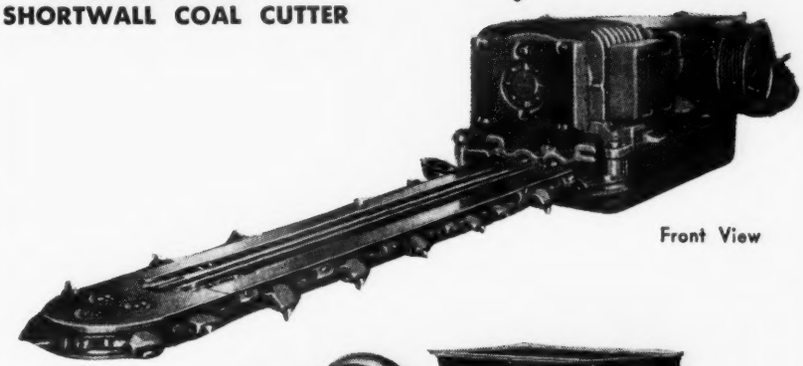
IMMEDIATE DELIVERY

... Three and one-half million dollars in new and nearly new coal mining machinery and equipment

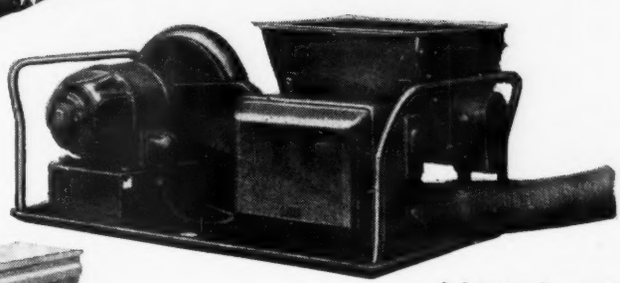


Rear View

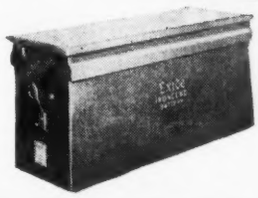
GOODMAN TYPE 112 SHORTWALL COAL CUTTER



Front View



Safety Appliance Co. Rock Duster



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ROTARY CAR DUMPER for 36" Cars With Automatic Control.

HOISTS—1 Double Drum Conical Hoist—Denver Engineering Works—300 HP., Silent Chain Drive, Complete With All Panelboards, Transformers and Controllers and Numerous Others.

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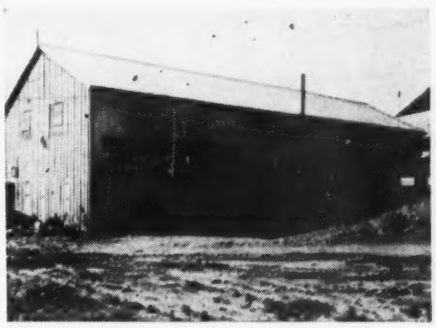
Inside View Machine Shop Showing Overhead Traveling Crane



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AMERICAN CHAIN & CABLE

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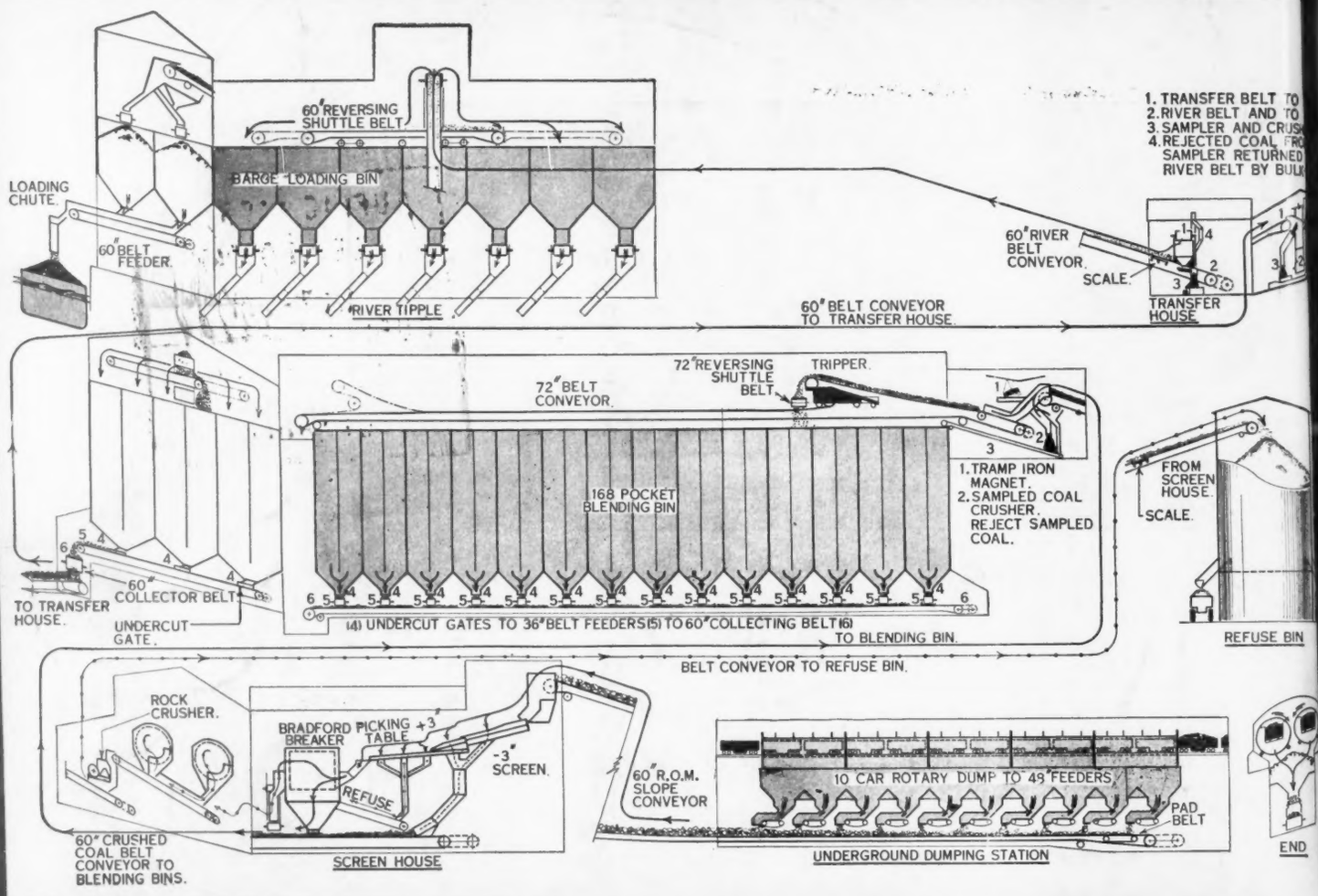

Another Complete LINK-BELT Plan

Everything in the way of dumping, conveying, screening, picking, crushing, blending and barge loading machinery at the Robena, Pa. mine of H. C. Frick Coke Company was furnished by Link-Belt.

The flow-sheet shows the scope of this operation. Its capacity of 2800 tons per hour is believed to be the largest in the world from a single mine opening. It is an outstanding integration of modern engineering and equipment for high production, high efficiency, low cost operation and safety.

Let us give you more details on the complete Link-Belt line of equipment, experience, performance and centralized reliable responsibility in all phases of coal handling and preparation.

LINK-BELT COMPANY

Chicago 9, Philadelphia 40, Pittsburgh 19, Wilkes-Barre, Huntington, W. Va., Denver 2, Kansas City 6, Mo., Cleveland 13, Indianapolis 6, Detroit 4, St. Louis 1, Seattle 4, Toronto 8. 10,767

000 Ton Barge oading Bins
18,000 Ton Blending Bin Equipped with 72" Wide Belt Tripper and Shuttle Belt
2800 T.P.H. Screening, Picking and Breaker Plant
60" Wide Slope Belt Conveyor which Receives Coal from Two 10-Car Rotary Dumpers
Refuse Belt Conveyor and Storage Bin